







Presented to Dr A. Chrastzowelder
by his friend J. Brighton Howard



AN
ELEMENTARY TREATISE
ON
MIDWIFERY;
OR,
PRINCIPLES OF TOKOLOGY AND EMBRYOLOGY.

BY
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ETC. ETC.

TRANSLATED FROM THE FRENCH,

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THIRD AMERICAN EDITION,

WITH NOTES AND ADDITIONS

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THE DISEASES OF WOMEN AND CHILDREN, ETC.

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NOTICE.

THE great demand for Velpeau's Midwifery, the whole of the first edition of which has been for some time exhausted, has induced the proprietor to publish a second edition. The translator has taken the liberty, which he hopes will not be displeasing to the celebrated author of the work, of adding a few notes at the foot of the page, which are marked with the initial letter M. It was with the utmost deference for the author of the volume, that, in some of these notes, he has ventured to express his dissent from a few of the opinions of one who, at the present time, stands scarcely second to any physician in Europe.

CH. D. MEIGS.

PHILADELPHIA, *April 20th*, 1838.

NOTICE.

THE second American edition of Velpeau's Midwifery is exhausted, and the pressing demand for it by the medical profession has induced the Publishers to make immediate arrangements to issue a third edition.

As Professor Meigs, who translated the work, and enriched the second edition with a variety of valuable notes, is absent on a professional tour through Europe, the duties of bringing out a third edition have been assigned to me.

The notes of Professor Meigs are retained in this edition, and are designated, as before, by his initial letter: those added by me are marked with the letter H.

Among the many valuable works on Midwifery which have issued from the Continental, British and American Press, during the last fifteen years, Velpeau's, as an *elementary treatise*, stands unrivaled. As a *text book*, it has been adopted by several of our most celebrated American medical colleges.

When he wrote this work, he was not only extensively acquainted with medical literature, but had spent much time in the dissecting room, where he had carefully investigated nature for himself. As a lecturer, he was a favourite, and enjoyed a large share of public confidence as an obstetrical practitioner.

M. Velpeau, by steady and well directed personal endeavours, has worked himself up from the most obscure origin to the enviable professional eminence he now occupies. He is only fifty years of

age, and has written for the press more than *twenty-five thousand pages*. Besides *seventy-two* valuable *medical works*, there are *one hundred and forty* other *articles* and *memoirs* that are ascribed to his pen.

In his style he is perspicuous, simple and unpretending; and his mind is so richly stored with knowledge on all subjects that he is called the *living encyclopedia*.

It need scarcely be added that his opinions are authoritative with the profession generally.

WILLIAM HARRIS.

July 4th, 1845.

AUTHOR'S PREFACE.

CONFOUNDED with the other branches of medicine, and pursued almost exclusively by mere medicasters during a long series of ages, the Art of Midwifery has advanced with extreme slowness. Among the Egyptians, the Hebrews, the Greeks and the Romans it was reduced in some sort to what concerns the cutting of the umbilical cord ; and even at the present time, in countries that are imperfectly civilized, those who make a profession of it inspire so little confidence, that the husband is still compelled to imitate the conduct of the first man, that is to say, he becomes the accoucheur of his wife. These primitive notions have doubtless long ceased to exist amongst us ; in our day the Art of Midwifery is especially seen to acquire a rapid movement, and to progress equally with the other departments of the art of curing. It would, however, be wrong to conclude from hence, that every thing has been already done, and that no further improvements can be made. The Science of Obstetrics ought to follow the movements of the age, and advance if it would not retreat. It seems to me that it may be defined, *the ensemble of knowledge relative to the reproduction of the human species*. By studying it under this extensive and philosophic view, and by doing away the absurd and vulgar prejudice, that it is impossible to be at the same time a skilful accoucheur and an able physician, we shall succeed in establishing it upon a basis worthy of the subject !

In this book I have endeavoured not to be unjust to any one. I

have spoken on all occasions without being influenced by hatred or prejudice, and I may add, without enthusiasm, and with absolute independence. The sciences compose a republic in which every man is at liberty to make researches, to examine and think for himself, as well as to say what he thinks. Truth is the avowed object of all who cultivate them: it may be reached by a hundred different routes, and I could never understand how any reasonable man could be offended because his ideas fail to be received as laws for other men.

In adopting a course somewhat different from that pursued by the modern classic writers, I was not misled as to its merits. No person attaches less importance to classifications than I do, or is more fully convinced that every one has an equal right to choose for himself. The course I have chosen appeared to me to be more natural than any other; I found that one was necessary for my purposes, and I preferred this one; I shall, therefore, make no further attempt to justify it. It belongs to the public to decide whether it be good or bad.

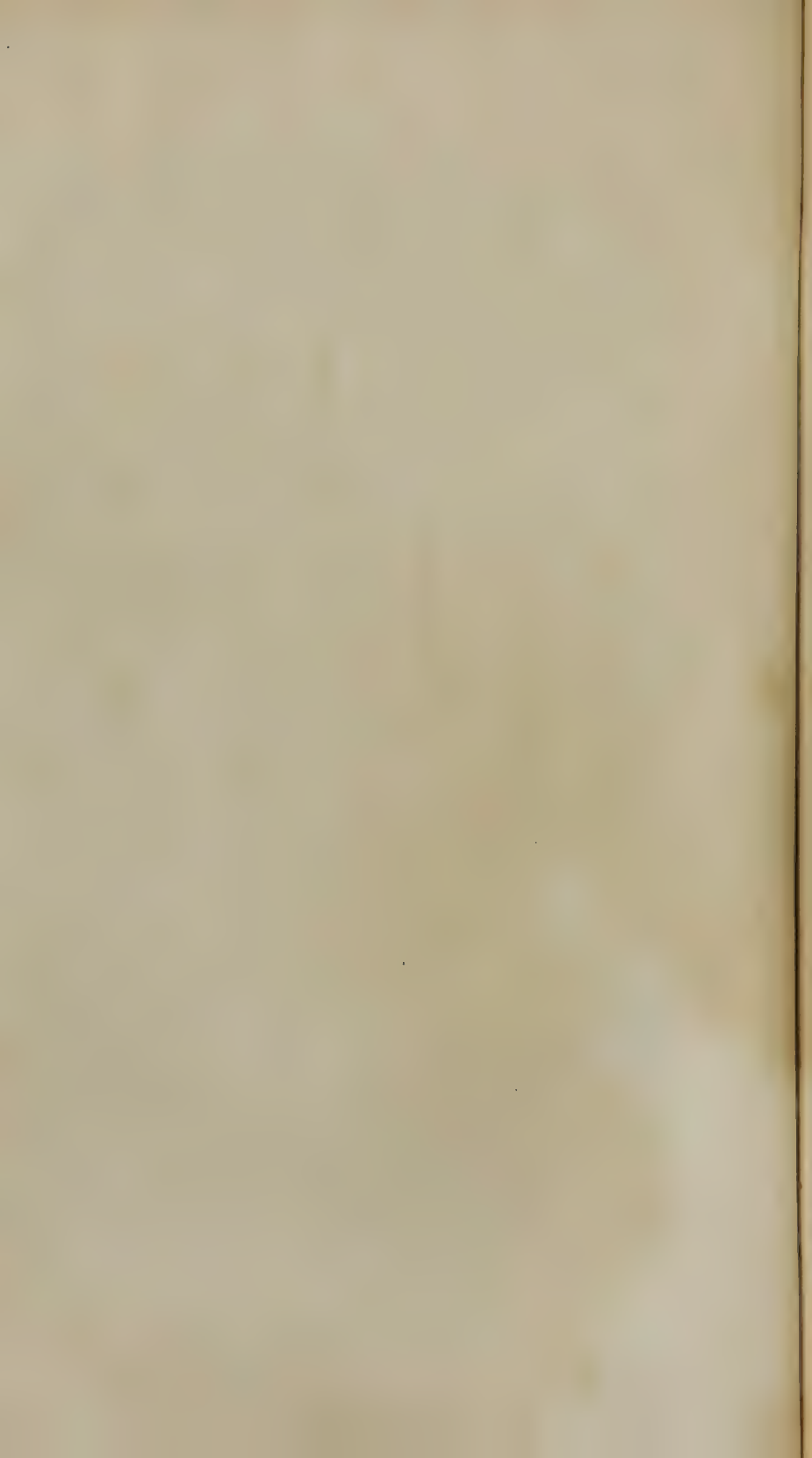
I have given a name to the science of the accoucheur; in the first place, because it is a substitute for a periphrasis; and in the next, because it is quite extraordinary that that science should have remained until the present day without any special qualification in France. From the earliest years of my studies, I employed the term (*obstetricie*) obstetrics, derived from the Latin *obstetrix*, midwife. I think it more uniform in acceptation than the word *obstetrique*, which is used in Germany, and which M. Dugès has desired to establish among us. But the word *tokology*, derived from *τοκος*, child-birth, and from *λογος*, word, out of which may be constructed the terms *tokological*, *tokologist*, *tokologue*, *tokograph*, &c., and which present nothing hard or difficult in their pronunciation, has seemed to me more conformable to the habits of our language and the rules of grammar.

It is of the nature of a preface to set forth the motives of the

author of a doctrinal book, and the advantages which he supposes himself to enjoy over his predecessors. I hope that I may be permitted to dispense with this common form. Since the time of Baudelocque very good treatises on Midwifery have been composed ; I am the first to proclaim it, and have not the smallest intention to contest the rights which their authors may have acquired to the enjoyment of the public esteem. But at the present day, every thing proceeds with such rapidity, that each moment is, so to speak, marked by new wants. Besides, as the last speaker, I might hope that I could produce a work, if not better, at least equally useful with others ; it remains to be seen whether I have succeeded.

In composing it, I have attempted to make a profitable use, not only of the works of my own countrymen, whether ancients or cotemporaries, but also of all such foreign writers as I could have access to. Numerous materials have also been furnished by between one thousand and twelve hundred labours, examined with care either at the *Maternité* at Tours, and the hospital *Saint Louis*, while I was a student there, or at the hospital *de perfectionnement*, while I was in service there as Chef de Clinique, or at my amphitheatre and in my private practice, since I began to teach tokology ; lastly, I have thought it best to embody in the work a detailed extract of a treatise on Embryology, which I have been preparing for a long time past.

I may be permitted to make an appeal to my brethren upon this subject. If, in the space of six years, I have been enabled to make dissections of nearly one hundred and forty products of conception within the third month of gestation, I am indebted for those opportunities to the kindness of a great many physicians and female practitioners of midwifery. I shall testify my thankfulness to them in another work, but in the mean time, I cannot express the amount of obligations they will confer by continuing to send me such specimens.



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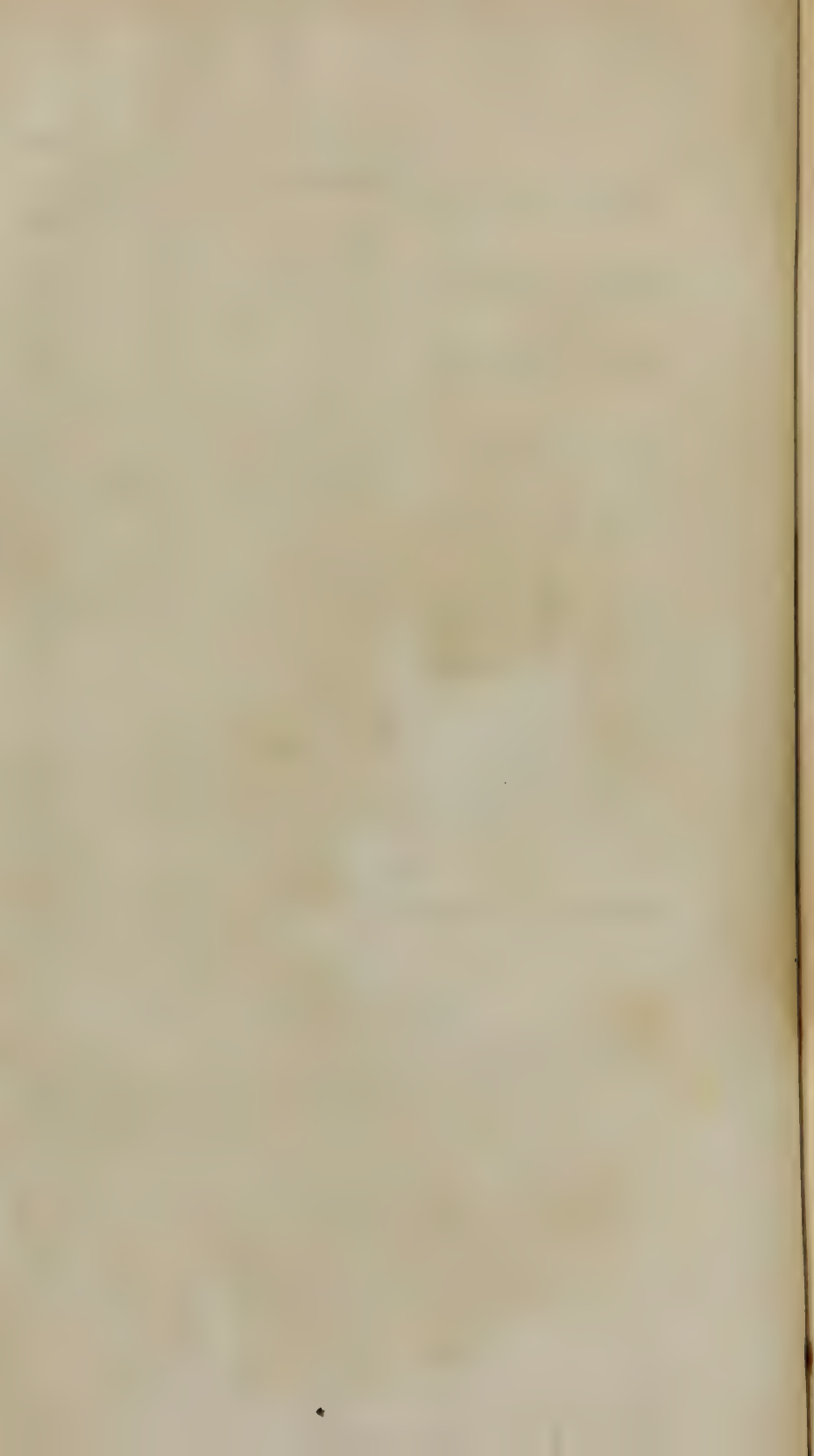
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AN ELEMENTARY TREATISE ON MIDWIFERY.

CHAPTER I.

OF THE PARTS THAT ARE CONCERNED IN GENERATION, PREGNANCY, AND LABOUR.

ARTICLE I.

OF THE PELVIS.

1. THE pelvis, a sort of bony girdle or cavity, which constitutes the inferior termination of the trunk of the body, is found, in the human species, between the spine, which it supports posteriorly, and the thigh bones, on which it rests anteriorly. Its shape, which is very irregular and difficult to describe, resembles in some measure that of a cone, with its apex and base strongly inclined towards each other, on their anterior face. Regarding it as an appendage both of the vertebral column and of the inferior extremities, the anatomists who lived antecedently to the time of Vesalius, gave no particular description of it. Diemerbroeck, Dionis, Saint Hilaire, Mauriceau, and De La Motte scarcely dwell for a moment upon it in their works; and even at the present day the learned who aim to promote the honour of what is called philosophical anatomy, have, for the major part, returned in this respect to the same way of thinking as the ancient naturalists. But although the development of the skeleton might, in a system of general zoology, permit us to take such a view of it, it does not follow that we ought to do so in tokology.* The accoucheur must necessarily study the pelvis as a portion distinct from, and, as far as connected with his art, independent of the rest of the body. Hence it is, that all authors since the time of Smellie and Levret have followed this course; which I shall accordingly adopt.

* From *τοκος* “child-birth,” and *λογος* “a discourse.”—H.

SECTION 1.

Of the Bones of the Pelvis.

2. There are four bones in the adult pelvis; the sacrum and coccyx posteriorly, and on the median line; and the coxal bones in front, and on the sides. As he who is destined to engage in the practice of midwifery ought to be made acquainted with the entire pelvis, I do not deem it necessary to dwell at length upon the graphic details that are to be found in most of the classical works upon each constituent portion of it. On this subject there exists, even in our most modern works, quite a faulty mode of exposition, which it is proper to reform: after the manner of Baudelocque, the pubis, the ilium and ischium are minutely described as so many separate bones, while for the most part, the coxal bone is almost entirely lost sight of; and yet it alone possesses any considerable interest in relation to midwifery, inasmuch as the three pieces of which it is composed are united into one before the individual is liable to become pregnant.

§ I. OF THE SACRUM (*os sacrum, s. clunium*).

3. The sacrum, a single bone, situated between the last lumbar vertebra and the coccyx, is locked in, as it were, between the two ossa ilia.

4. Of a triangular or pyramidal shape, curved forwards on its anterior surface, it presents to the examiner, successively, an internal or pelvic region, and external or posterior region, two edges, a base and an apex.

5. Its *anterior surface*, somewhat concave, presents, 1. Along its middle, four or five quadrangular facettes,* and the same number of transverse lines; 2. Outwardly, the five anterior sacral holes, terminating in an equal number of converging grooves, for the passage of the anterior branches of the sacral nerves; 3. More outwardly still, and between these openings, certain rough, uneven surfaces for the attachment of the pyramidal muscles.

6. Its *posterior surface*, which is convex and very uneven, exhibits, along its middle, a series of protuberances which, by their union, constitute the crista of the sacrum; above this crest is seen the opening of the sacral canal; below are the two branches formed by its bifurcation, the triangular space which terminates the spinal canal, and the tubercles or points called the horns of the sacrum. On either side of the false vertebral spines, are seen the sacral grooves, the posterior sacral holes, and still nearer

* Five quadrangular facettes, and four transverse seams.—H.

to the edges of the bone are to be found certain rough surfaces that serve for the attachment of the posterior sacro-iliac ligaments.

7. Its *edges* may be divided into two portions; one, superior, very thick, exhibits, on its anterior half, a semilunar articular facette which unites it to the coxal bone; on its posterior half, a hollow, and certain rough protuberances for the attachment of the sacro-iliac ligaments; the other, inferior, thin, almost sharp, serves for the insertion of the sacro-sciatic ligaments.

8. Its *base*, very broad, looks upwards. On its middle may be seen a plain elliptical surface, situated transversely, inclined more or less backwards, and which is articulated with the last lumbar vertebra; outwards and a little forwards, a triangular surface, the *lesser wing of the sacrum*, which is slightly depressed towards its anterior face, and concurs in forming the internal iliac fossa; lastly, we observe on the posterior surface, the opening of the sacral canal, and the two articular apophyses of the first piece of the sacrum.

9. Its *apex*, thin, elliptical, slightly convex, is received into the base of the coccyx.

10. The sacrum, a simple prolongation of the spine, is formed by the union of five vertebræ. Nearly forty points of ossification may be observed in it; at birth,* it is still formed of fifteen pieces, three for each vertebra; but soon afterwards it only exhibits five, which, also, always coalesce before the age of puberty.

§ II. OF THE COCCYX (*ossa coccygis*).

11. The coccyx is a sort of rudimental sacrum, whose anterior face almost plain, supports the end of the rectum, while its posterior surface, slightly convex, is only separated from the skin by the posterior sacro-coccygeal ligament. Its edges serve as points of attachment for the small sciatic ligament, and ischio-coccygeus muscle; its base, somewhat concave, surmounted laterally by two prolongations resembling horns, is articulated with the apex and cornua of the sacrum. Its apex, tubercular and rounded, gives insertion to the external sphincter of the anus.

12. The three or four pieces of which it is composed, mere vestiges of an equal number of vertebral bodies, remain for a long while movable upon each other; however, they at length coalesce; but, in most women, the bone, as a whole, loses its power of moving upon the sacrum only at a very advanced age.

§ III. OF THE COXAL BONE (*os coxalium*).

13. The bone of the ilium, the hip bone, the nameless bone, or more properly, as was long ago indicated by Celsus, the *coxal*

* That is, at the end of the 7th month of fetal life.—H.

bone,* situated between the femur and the sacrum, alone forms the two anterior and lateral thirds of the pelvis.

14. Of an irregular quadrangular shape, looking as if strangulated at its middle, and twisted in two opposite directions, the coxal bone exhibits two surfaces and four edges.

15. On its *internal* or pelvic surface, which is divided into two nearly equal portions, we distinguish, above, a large excavation called the internal iliac fossa, which is filled by a muscle of the same name; behind, an articular surface, of a semilunar shape called the articular facette; still farther behind, certain rugosities, similar to those observed on the edge of the sacrum, with which they unite.

On its inferior half, and posteriorly, is seen a plane, almost triangular surface, which corresponds to the cotyloid cavity, and to the body of the ischium; in its middle, the sub-pubal opening; in front, the internal face of the pubis, and of the ischio-pubal ramus.

16. A semicircular edge, thick, smooth, and rounded posteriorly, thin and sharper in front where it terminates in the crista of the pubis, an edge which forms the greatest part of the superior strait, and unites these two halves of the pelvic surface of the coxal bone.

17. Its *external* or femoral surface exhibits, on its upper half, what is called the external iliac fossa, filled by the three glutei muscles; below, the sub-pubal hole, the external face of the ischium and ischio-pubic ramus; in the middle, the cotyloid cavity.

18. Its *upper edge*, or the iliac crista, thicker both posteriorly and anteriorly than in the middle, twisted like an italic *s*, divided by the anatomists into an external lip, an internal lip, and an interstice, for more conveniently describing the attachment of muscles, terminates in front, by the anterior-superior spine of the ilium, and behind, by the postero-superior spine of the ilium.

19. Its *lower edge* presents three portions; superiorly, an oval surface for the articulation of the pubes; inferiorly, the tuberosity of the ischium; and in the middle, the edge of the ischio-pubic ramus, turned somewhat outwards.

20. On its *anterior edge*, proceeding from above, downwards, and from the ilium towards the pubis, we remark the superior iliac spine; a small semilunar notch; the inferior iliac spine; the groove for the psoas and iliac muscles; the ileo-pectineal eminence, for the insertion of the lesser psoas; a triangular surface, smooth, inclined forwards, and concealed by the pectinalis muscle; the crest; then the spine of the pubis; and, lastly, the angle of the pubis.

21. On its posterior edge, in proceeding from above downwards, is seen the posterior superior spine of the ilium; a small irregular

* From coxa "hip."—H.

notch; the postero-inferior spine of the ilium; which articulates with the sacrum; the great ischiatic notch; the ischiatic spine; the small ischiatic notch, and the most posterior portion of the tuberosity of the ischium.

22. At birth, the coxal bone is composed of three distinct pieces: one superior, the *ilium*, which constitutes the hip and the two iliac fossa; one inferior, the *ischium*, which supports the weight of the body when seated; the third, anterior, the pubis, to which are appended, as it were, the organs of generation. It is in the cotyloid cavity, at the ileo-pectineal eminence, and in the middle of the ischio-pubal ramus, that these three bones at length are blended into one about the period of puberty; but there are commonly added in childhood, a plate for the crest of the ilium, one for the tuberosity of the ischium, another point of ossification for the antero-inferior spine, and a fourth for the spine of the pubis; which sometimes do not coalesce with the principal pieces until a very late period.

SECTION 2.

Of the Articulations, or Symphyses of the Pelvis.

23. There are three principal articulations of the pelvis: one for the two pubes in front, and two for the bones of the ilium and the sacrum behind.

24. At the *anterior* or median *symphysis*, the bones are kept in contact by a fibro-cartilaginous substance called the interpubal ligament, and whose thickness is far from being uniform at every point of the kind of ring or oval circle which it represents. Its thickness, which is very considerable on the upper part, a little less so in front, and much less so behind, becomes suddenly much greater below, where the fibrous body assumes the name of subpubal or triangular ligament.* In the centre, the articular surfaces are separated by a very thin plate of cartilage, which in early life, and even in a good many adult women, is moistened by a small quantity of synovial fluid.

A portion of the periosteum lines the posterior surface, a fibrous lamina of the same material is observed in front, and these two layers have received the names of anterior and posterior ligaments of the symphysis pubis.

25. The *sacro-iliac* or posterior *symphyses* are much more complex than the preceding. There the sacrum is locked, like a double

* At the symphysis pubis there are two smooth cartilaginous surfaces, a synovial membrane and a small quantity of synovial fluid, constituting a complete joint.—H.

wedge, between the coxal bones, so that it offers a very efficient resistance to the weight of the body, which presses it from above downwards, and to the efforts of the pelvic viscera, which tend to force it backwards; its articular surfaces, although uneven, are nevertheless covered with a very thick diarthrodial cartilage, while those of the iliac bones are wholly destitute of them.

26. The name of posterior sacro-iliac ligament is given to a collection of fibrous bundles, that are yellow, elastic, mixed with small lumps of fat which fill up the uneven and rugose excavation that is seen behind the cartilaginous surfaces. These fibrous bundles of the same nature with the yellow ligaments of the vertebræ, are composed of fibres decussating in every direction, and are united almost intimately with the sacrum and coxal bones. Being of considerable strength, they give an extraordinary solidity to the articulation which they concur in forming. There is not, rigorously speaking, any anterior sacro-iliac ligament: a simple lamella of the pelvic periosteum serves in its stead.

27. Other small fibrous bands also serve, but less immediately, to unite the bones of the pelvis behind. These are the sacro-sciatic,* and sacro-spinal ligaments; which, by passing from the posterior spines of the ilium, and from the inferior half of the edge of the sacrum to the spine, and tuberosity of the ischium, convert the two ischiatic notches into holes.

28. The connections of the pelvis with the vertebral column and with the coccyx, are effected by two amphiarthroses.

29. One, the *sacro-coccygeal articulation*, is composed, 1. Of an elliptical fibro-cartilaginous lamina, which unites the point of the sacrum to the base of the coccyx; 2. Of the posterior sacro-coccygeal ligament, a sort of prolongation or extension of the supra-spinal ligament of the vertebræ, which closes the lower extremity of the sacral canal; and 3. Of the anterior sacro-coccygeal

* The greater sacro-sciatic ligament arises from the posterior inferior spinous process of the ileum, from the margin of the sacrum below its junction with that bone, and from the first bone of the coccyx, and is inserted into a rough ridge along the internal margin of the tuberosity of the ischium.

The lesser sacro-sciatic ligament arises from the posterior surface of the sacrum below the ileum, and from all the bones of the coccyx, and is inserted into the spinous process of the ischium.

By these two ligaments, the sacro-sciatic notch is converted into two foramina; through the upper and larger of which pass out the gluteal, sciatic and pudic arteries, the sciatic and pudic nerves, and the pyri-form muscle; and, through the lower foramen the internal pudic artery and nerve re-enter, and the obturator internus muscle passes out.—H.

ligament, formed of two lateral bands united at their point on the front of the second or third piece of the coccyx. Naturally very movable in women, this articulation permits the coccyx to turn backwards, from half an inch to an inch, while the child is passing through the lower strait.

30. The other, the *sacro-vertebral articulation*, differs from the vertebral amphiarthroses, only in the thickness of its fibro-cartilage; in the obliquity of the articular faces of the last lumbar vertebra, and of the sacrum, an obliquity which produces the *sacro-vertebral angle*, or the *promontory*; and by the presence of the *ilio-lumbar ligament*, which extends from the last transverse vertebral apophysis to the posterior extremity, and not to the posterior spine of the iliac crest, as is incorrectly asserted by several modern authors.

31. The obturator membrane, and the ligament of Fallopius, which extends from the anterior superior spine of the ilium to the spine of the pubis, constituting the *crural arch*, and separating, before it terminates, into two columns to form the *inguinal ring*, completes the *ligamentous apparatus of the pelvis*.

SECTION 3.

Of the Pelvis in general.

§ I. EXTERNAL SURFACE.

32. The principal use of the external surface of the pelvis, which is very uneven, is to give attachment to the muscles which surround the *coxo-femoral articulation*; it may be divided into four regions.

33. The first, *anterior*, bounded on the sides by the *cotyloid cavities*, presents, in its middle, the front of the *symphysis of the pubis*, and laterally, the *external obturator fossa*, filled with the corresponding muscle.

34. The second, *posterior*, bounded by the projection of the *coxal bones*, is formed almost wholly by the posterior surfaces of the *sacrum* and *coccyx*. Consequently, we may observe in this region the *sacral crista* and the lower orifice of the *spinal canal*; the *sacral portion of the vertebral grooves* filled with the point of the *sacro-spinal muscle*, and in the bottom of which are seen the *ten posterior sacral holes*, from whence pass the nerves of the same name.

35. The two last, *lateral*, enclosed by the preceding, present the *external iliac fossæ* above; below and behind, the *posterior surface of the sacro-ischiatic ligaments*, and the *plane of the notches or holes of the same name*; below and forwards, the *cotyloid cavity* which receives the head of the *femur*.

§ II. INTERNAL SURFACE.

36. The ancient authors have compared the pelvis to a barber's basin. Although trivial, this comparison, nevertheless, gives a pretty exact idea of it. We may, with the moderns, divide its inner face into two parts: one, *superior*, which bears the name of *greater basin*, *upper basin*, or *abdominal basin*, on account of its dimensions, its situation, or the parts it encloses; the other, inferior, and which is also known as the *lesser basin*, or the *pelvic excavation*.

37. The abdominal basin constitutes part of the belly. Of an elliptical form, largely notched in front, where it corresponds to the hypogastrium, notched also behind, in order to receive the lower end of the spine, this cavity is composed of the two internal iliac fossæ, which belong to the coxal bones, as well as to the lesser wings of the sacrum, and which are occupied by the sigmoid flexure of the colon on the left, the cæcum on the right, and by some folds of the small intestines on both sides.

38. The *lesser basin* may be considered as part of a canal larger in the middle than at its two extremities, curved anteriorly, and destined to contain the internal genito-urinary organs, the rectum, and the hypogastric and sacral vessels and nerves. In order to obtain a clearer idea of it, it is well to follow the advice of M. Chaussier, that is to say, to remove the greater basin* by a horizontal section with a saw. Like the external surface, it may be divided into four regions, and circumscribed in the same way, always excepting the lateral regions, which leave the internal face of the ilium above them.

39. The *anterior* region of the lesser basin, very greatly notched below by the pubic arch, slightly convex from above downwards, and concave transversely, comprises the posterior face or the bodies of the pubes, of the ischio-pubal rami, and of the obturator membranes. We may remark, 1. On the median line a perpendicular crest, more or less salient, formed by the posterior part of the symphysis pubis; 2. Outwardly, the internal obturator fossa, surmounted by a canal, (and not a simple hole,) oblique from behind forwards, and from without inwards; through this, which is called the sub-pubal or obturator canal, the obturator vessels and nerves proceed from the interior of the pelvis to the inner side of the thigh.

40. The *posterior* region, very much excavated, is represented

* The *upper* basin may be removed from the *lower*, by a horizontal section with a saw, passing along the linea-ileo-pectinea, to the promontory of the sacrum. Thus separated, the *upper* or *abdominal* pelvis will have no bony depth either before or behind, and only three inches and a half laterally.—H.

by the anterior surface of the sacrum, of the coccyx, and of the root of the sacro-ischiatic ligaments.

41. The *lateral* regions, formed in front by the internal face of the cotyloid portion and the rest of the ischium, behind by the inner face of the sacro-ischiatic ligaments, are largely opened by the two sciatic holes. Of these two openings, one, superior and the largest, is of an oval shape, and gives passage from within the pelvis, 1. To the pyramidal muscle, which is inserted into the great trochanter; 2. To the great sciatic nerve, which proceeds to be distributed on the back part of the thigh, the outer and back part of the leg, and to the whole foot; 3. To the gluteal artery, and to the internal pubic vessels and nerves: the other, inferior, much smaller, of a triangular shape, is filled by the internal obturator muscle, which proceeds to join the tendon of the pyramidalis in the digital cavity of the great trochanter, and by the pudic vessels and nerves which re-enter the pelvis to be distributed in the perineum.

42. Suppose a vertical cut, which should divide the lesser basin into four equal parts, there would be found four planes* inclined towards each other at their points. The two anterior inclined planes comprise a portion of the lateral regions and the whole of the anterior region of the excavation; the two posterior are formed by the front of the sacrum and coccyx, by the sciatic ligaments and notches, and the sacro-iliac articulations. It is always on two of these four surfaces that the extremities of the diameters of the foetal head glide, during parturition.

§ III. STRAITS OF THE PELVIS.

43. A. *Superior strait*. The sort of horizontal circle which separates the internal surface of the pelvis into two parts, is called the superior or abdominal strait, greater strait, or margin of the pelvis: formed behind by the sacro-vertebral angle and the anterior edge of the lesser wings of the sacrum, outwardly by the rim which limits the iliac fossa below, in front by the superior posterior edge of the body of the pubis; it is thick or rounded in the

* In order to give the student a clear view of these planes, it is necessary to divide the lower pelvis by two vertical cuts with a saw, into four parts. The first cut should be made through the symphysis pubis and median line of the sacrum and coccyx, and the second, or transverse cut, should commence behind the tuberosity of the ischium on either side, and pass up in nearly a perpendicular direction, through the apex of the spine of the ischium, up to the *linea ileo-pectinea*. By these two vertical cuts, there will be an *anterior* and a *posterior* inclined plane, demonstrated on each side of the pelvis, and the *anterior* will be the longest.—H.

first portion described, while in the second it, on the contrary, grows thin, and is transformed, so to speak, into a crest.

44. Its form in the dried pelvis approaches more or less to that of an oval, of the heart on a card, or of an ellipse; but with the soft parts it represents a triangle, with the base in front.

45. Its *inclination* downwards and forwards, when the woman is on foot, varies from thirty-five to fifty degrees. This inclination is less in the sitting posture, and when the person lies down or bends forwards; it increases in pregnant woman, in those who make use of their abdomen to support heavy burdens, as is the case at Paris with the women who sell fruit, vegetables, fish, &c.; also while on the knees; and whenever, for the purpose of preserving the equilibrium, we attempt to throw the upper end of the central line of the body backwards.

46. Its *axis** is an imaginary line extending from the umbilical region to the lower two-thirds of the front of the sacrum. Every degree of inclination of which the plane of the strait is susceptible, is equally applicable to its axis, since the latter must pass through the former. The upper extremity of this may rise higher or fall lower, according as its lower extremity recedes from or approaches towards the point of the coccyx. In this respect there are infinite shades of difference, which must not be lost sight of in practice, whether the labour be terminated spontaneously, whether the child must be turned, sought for by the hand, or delivered with instruments.

47. Its principal *diameters*† are four in number: the *sacro-pubal*, or *antero-posterior*, which extends from the most salient point of the sacro-vertebral angle to the posterior surface of the symphysis pubis; the *transverse* or *bis-iliac*, which passes from the lower edge of one iliac fossa to a point diametrically opposite; the two *oblique* or mean diameters, which proceed from the sacro-iliac symphysis, and terminate behind the ileo-pectineal eminence of the opposite side.

48. The length of the first or small diameter is, according to Madame Boivin, and most of the French authors, four inches; and four inches and four lines according to Meckel; that of the second is five inches; that of the third from four inches and four lines to four inches and a half: so that their union gives a circumference of about thirteen inches and a half. But these dimensions are

* The axis of the superior strait extends from the umbilicus to the junction of the sacrum and coccyx.—H.

† The diameters of the *superior strait*. The *sacro-pubal*, or *antero-posterior* is four inches; the *bis-iliac*, or *transverse*, is five and a quarter; and the two *oblique* are, each, five. The *circumference* is thirteen and a half inches.—H.

subject to great variety, and ought not to be understood here except in a very general manner.

49. B. *Inferior strait.* The *inferior* strait, lesser strait, perineal strait, or apex of the pelvis, is formed by the point and edges of the coccyx, the edges of the sacro-sciatic ligaments, of the tuberosities of the ischium, and the ischio-pubal rami; it accordingly presents three triangular projections, the coccyx behind, and the two ischia on the sides; as well as three indentations, one anterior, very deep, known as the arch of the pubis, and two others, posterior, still deeper and very irregular when the sciatic ligaments are removed, but, on the contrary, quite superficial when these fibrous bands are in their natural situation. Its form is precisely like that of the heart on a playing-card; only it may become oval by the retreat backwards or the removal of the coccygeal triangle; it being in the mean while understood that the widest, most open part of these figures is always turned backwards.

50. Like the abdominal strait, the inferior strait* has four diameters: one, the coccy-pubal, or antero-posterior, is measured from the point of the coccyx to the top of the arch of the pubis; another, the transverse, or *bis-ischiatic*, from the posterior and interior part of one tuberosity of the ischium to that of the opposite side; the two last, or the *oblique* diameters, reach from the point where the rami of the pubes and the ischia meet, to the middle of the edge of the sacro-sciatic ligaments.

51. These diameters are generally found to be four inches each; however, M. Meckel gives to the first four inches and four lines, and four inches six lines to the second. M. Delpech is surely incorrect in giving as the mean term four inches and a half to one, and five inches to the other. The mobility of the coccyx, and the elasticity of the sciatic ligaments, render the antero-posterior diameter capable of being prolonged four, six, eight, or even twelve lines, while the oblique diameters are also evidently capable of being elongated; the transverse, on the contrary, I have always found to be a few lines less than four inches. Thus the circumference of the perineal strait should be about twelve inches.

52. In general, the plate of the inferior strait is inclined slightly upwards, so that the line that represents it crosses that of the superior strait in front of the symphysis of the os pubis; however, it is sometimes found to be horizontal, and even below the level of the coccyx.

* The diameters of the *inferior strait.* The *coccyx-pubal*, or antero-posterior is four and a half inches; the *bis-ischiatic*, or transverse, four inches; and the two oblique, each, four. The circumference is twelve.—H.

53. The axis* of the inferior strait is represented by a straight line drawn from the interior of the pelvis, and cutting the middle of the coccy-pubal diameter at right angles; the upper extremity of this line most commonly rises as high as the sacro-vertebral angle, and sometimes is found to be even parallel with the spinal column, and may approach even nearer to the axis of the superior strait in very many instances, as is proved by the late researches of Professor Nægèle, and as I have ascertained for myself.

54. In order to obtain correct notions on this subject, it is necessary to suppose the coccyx depressed, as it is by the head of the fœtus at the moment of delivery; the posterior extremity of the coccy-pubal diameter will then be found lower than its anterior extremity; and the axis of the strait descends obliquely from behind forwards, under an angle of from fifteen to twenty degrees, passing from the anterior face of the first or second piece of the sacrum, through the middle of the space which separates the anterior parts of the tuberosities of the ischia; it is requisite, further, not to forget that in the living subject, and particularly during the passage of the head, the obliquity of this line is so much increased, that it becomes almost parallel with the plane of the superior strait.

§ IV. DIMENSIONS OF THE EXCAVATION.

55. The anterior wall of the pelvic cavity, opposite to the symphysis of the pubis, is only eighteen lines high; but more outwardly it is near three inches: the depth of the middle portion of the lateral regions is at least three inches and a half; the posterior wall is at least five along the median line, following the curve of the sacrum; and only four in a straight line, from the promontory to the point of the coccyx. From these differences it is manifest that the inclination of the straits will always be about two inches and a half, and in an inverse proportion, in each case; for the pubis cannot be depressed towards the horizon without an equal or apparent degree of elevation of the coccyx. The sacro-pubal diameter is increased, by descending to the centre of the excavation, from six to ten lines, on account of the concavity of the sacrum; the transverse diameter, on the contrary, diminishes gradually as it approaches the ischiatic, where it is only four inches. The oblique diameters alter but very little, and I am ignorant of the facts that might warrant M. Meckel in assigning to them a length of five inches and four lines.

56. As the anterior face of the sacrum presents us with a cavity that is irregular and of greater or less depth, it is easy to understand that a series of right lines that should fall perpendicularly

* The axis of the inferior strait extends from the promontory of the sacrum to the point below, at which the *coccy-pubal* and *bis-ischiatic* diameters intersect each other.—H.

upon it could not be parallel; that they would all converge towards each other, and cross at angles more or less acute in front of the articulation of the pubis, with the exception of one that would be exactly horizontal. For the same reason, we may imagine that the plane represented by each of these lines must have an axis as well as those of the straits, and consequently, that we cannot refuse to admit an axis of the excavation. The union of all these axes would give a curve, concave anteriorly, and whose two extremes would be represented by the central lines of the superior and inferior straits. By viewing the axis of the pelvis in this light, the accoucheur will always have before him the direction of the plane of the anterior face of the sacrum; of the coccyx, and even of the perineum; and as this is the plane that directs the head of the fœtus, such a mode of regarding it seems to me more simple, and much more useful for practice, than the method indicated by certain authors, and which is burthened with geometrical formulas.*

§ V. BASE OF THE PELVIS.

57. The great circumference or base of the pelvis looks upwards and forwards. Its plane is parallel to that of the abdominal strait. It is formed posteriorly by a notch, in the bottom of which is seen the base of the sacrum, and which is naturally filled by the last vertebra, the ileo-lumbar ligaments, and the quadratus lumborum muscles; outwardly, by the superior edge of the coxal bone, which affords attachment to the three broad muscles of the abdomen; that is to say, to the external oblique by its outer lip, to the transversalis by its inner lip, and to the internal oblique by its interstice; in front by the great hypogastric notch which looks from above downwards, and from without inwards; by the antero-superior spine of the ilium, to which are attached Poupert's ligament, the sartorius muscle, and a part of the iliac muscle and the fascia lata; a small semilunar depression for the passage of some nervous filaments going to the thigh; the antero-inferior spine of the ilium, which gives insertion to one of the roots of the rectus femoris muscle; a second depression for the passage of the united psoas and iliacus muscles; the linea ileo-pectinea, sometimes scarcely discernible, and sometimes very salient, and which receives the attachment of the psoas parvus; a third depression or triangular space filled up by the origin of the pectineus muscle, and corre-

* Vide Deventer (*Observ. sur le Manuel des Accouchemens*, 1734), who appears to have been the first to indicate that the cavity of the pelvis is not parallel to the axis of the body; Muller (*Collect. de Haller*); Roederer (*De axis pelvis*, &c., Gott. 1751); Smellie (*Treatise on the Theory*, &c., 1771); Levret (*Art des Accouchemens*, 1766); Camper (*Translation of Mauriceau*, 1759); Stein (*Art d'Accoucher*, 1804); Lobstein (*Bulletin de la Faculté de Médecine de Paris*, 1815); Flamant (*Thèse de M. Guillemot*, Paris, 1824, No. 164); Baker's Drawing, and especially the learned Memoir of M. Nægèle (*Das Wiebliche Becken*, &c., Carlsruhe, 1825, and in *Archives de Médecine*, June, 1827).

sponding to the crural vessel and nerves; the pectineal crista or postero-superior edge of the pubis, oblique from without inwards, which forms part of the superior strait, and terminates in the spine of the pubis, to which are attached the outer pillar of the abdominal ring and the rectus abdominis muscle; lastly, by the upper edge of the symphysis pubis.

§ VI. OF THE DIMENSIONS OF THE PELVIS, UNCONNECTED WITH ITS AXES OR STRAITS.

58. The space comprised between the two anterior inferior spines of the ilia, measures eight or nine inches; that between the antero-superior, from nine to ten; and from ten to eleven between the middle portions of the cristæ of the ilia. The length of the crest of the ilium, following its course from the postero-superior spine to the antero-superior tuberosity, is eight inches, and six inches in a straight line. The base of the sacrum is four inches across, and two inches and a half from front to rear. From the middle of the iliac crista to the tuberosity of the ischium is seven inches, and the margin of the excavation cuts this line into two nearly equal portions; the symphysis pubis, which is eighteen lines high, is only half an inch thick. The arch of the same name is from three and a half to four inches wide at its base where it blends with the bis-ischiatic diameter, and only ten or twelve lines at its apex; its height is two inches and a half, and the bony semi-circle of which it is composed is folded forwards and outwards, as if it had been turned in this way by the passage of some hard and rounded body, while still in a soft and plastic state.

§ VII. DIFFERENCES OF THE PELVIS, IN RESPECT TO AGES, SEXES AND SPECIES.

59. At birth the pelvis is extremely narrow and very much elongated; the curves of the iliac crista are scarcely begun, and the position of the ilium is almost vertical; the pelvic cavity is conoidal and not excavated, the sacrum is so much elevated that a horizontal line passes under the point of the coccyx at the same time that it rests on the top of the pubis; its transverse are much shorter than its antero-posterior diameters. The bones are still bordered with thick layers of temporary cartilages, and the whole is so compressible that the dimensions of the pelvic extremity of the fœtus may easily accommodate themselves to those of the maternal pelvis during labour. After two or three years, some new osseous points are produced, but they do not always coalesce entirely with the rest of the coxal bone until the age of fifteen or twenty years. The spine of the pubis has even been seen to acquire a length of six or eight lines, and remain movable like an independent piece, which has caused it to be compared to the marsupial bones of the didelphic animals.

60. It is therefore not until the fifteenth or eighteenth year that the evolution and union of the several osseous points of the pelvis are entirely completed ; so that previously to this age it is not the height of prudence to expose a woman to become pregnant.

61. In men the pelvis always retains, in respect to its form, the same characters it had in infancy. All its parts are narrower and deeper than they are in women ; the coccy-pubal diameter is only three inches and a quarter, the bis-ischiatic three inches, and the bis-iliac four and a half. There are only seven or eight inches between the antero-superior spinous processes, and eight or nine from the middle of one iliac crista to the opposite one. The arch of the pubis is straight, not wide in front, and almost triangular ; the symphysis of these bones is at least two inches long, and the thyroid foramen approaches also to the form of a triangle ; the sacrum is much less curved, the excavation not so deep, and the superior strait more inclined, rounder, more like an oval or a circle ; the iliac fossæ are more hollow, the great trochanters are not so far apart, the bones in general thicker, and especially more uneven on their outer surfaces ; in the male pelvis, every thing bespeaks strength and solidity, and is so arranged as to render *progression* easy.

62. In women, on the contrary, the articulations are not so compact ; they are thinner ; the iliac cristæ are wider, and turned outwards more than the base of the thorax, which gives a greater breadth to the hips. The trochanters widely separated, by increasing the transverse extent of the base of support of the body, also render walking more difficult, and give to the sex a gait that is altogether peculiar ; in a word, nature seems here to have sacrificed strength and ease of motion to the advantage of pregnancy and parturition.

63. In the male pelvis the coccyx early unites with the point of the sacrum, and the three symphyses frequently ankylose in old age ; in women the sacro-coccygeal articulation remains movable even until the period of decrepitude ; the sacro-iliac and pubic articulations are rarely ankylosed, even at the most advanced age.

64. In thin women, *and in those who are very tall*, the pelvis is not so wide, and resembles more nearly that of the male, than in persons of a short and well-proportioned stature ; which, in the opinion of the common people ; causes the former to bear children with more difficulty than the latter.

65. The *pelvis of animals* is notably different from that of the human species. If Roussel and some other philosophers had paid attention to this circumstance, they doubtless would not have maintained that labour requires no aid, because brutes are delivered of their young without needing assistance, and almost without pain. In fact, in most quadrupeds, the pelvis, scarcely curved, in reality presents only one single axis ; the sacrum is almost parallel with the

spine; the straits are only slightly inclined, and the walls of the pelvic canal are nearly all of the same length; the coxal bones are so narrow, straight and elongated, that there is, so to speak, no iliac fossa; so that delivery is not exposed, in these species, to the same hazards as in man.

66. It must not be thought, however, that nature changes thus suddenly, and without gradation, the forms of organs in a series of creatures; in the monkeys, the pelvis, by differing from that of the inferior animals, is found already to approximate somewhat to the character of the human pelvis; it is only by ascending the zoological scale, that we find it gradually becoming more perfect; its various shades may be traced in the ourang-outang, the Bosjesmans, who from their organization seem to constitute the connecting link between the monkey and man, in the Ethiopian or Negro, and the Malay or Japanese races, before coming up to the Caucasian race, in which it is removed as far as possible from the form observed in the other mammiferæ;* whence we have a right to presume that parturition is so much the more painful, as the species is more perfect, and *vice versa*: a compensation as admirable as it is singular, and which occasions dangers in some measure to multiply and accumulate around an animal in proportion as his intelligence becomes more perfect.

67. In the kangaroo and other marsupial animals, the pelvis is prolonged in front by means of the spines of the pubes; which form two separate bones, and support the pouch, in which the second gestation of these animals is effected; its narrowness in the cabiai and the mole would not admit of the escape of the young; but during gestation the pieces are disjoined, and separate considerably from each other. In the cetaceæ there are only some traces of a pelvis; and in birds, reptiles and fishes, where it serves only in depositing the egg, we find it gradually decomposed, until it disappears.

§ VIII. OF THE RECENT PELVIS.

68. The soft parts which naturally cover the interior of the pelvis, produce certain changes in its form and dimensions, the knowledge of which is indispensable to the accoucheur.

69. The inferior strait, for example, is shut up by a kind of partition, which is called the floor of the pelvis; a partition which diminishes the height of the excavation, and seems to be the antagonist of the diaphragm, or rather of the abdominal muscles, during the efforts of inspiration, defecation, and the emission of urine, and during parturition.

* On this subject the reader may consult an interesting work by Dr. Wrolick, who had in Holland an opportunity of comparing the pelvis of the Negro, the Japanese, Bosjesmans, Mustee and the Hottentot Venus, who was seen by many persons at Paris, and who was a veritable *Houzouanasse*. *Le Bulletin des Sciences Médicales*, for February, 1827, contains an extract from this memoir, which is also to be found in the bookstores at Paris.

70. This floor is composed of two fleshy layers: one, superior, concave above, is formed by the levator ani and ischio-coccygeal muscles; the other, inferior, concave below, is composed of the sphincter ani, transversus perinei, ischio-cavernosus, and constrictor vaginae muscles. There also are found the lower hemorrhoidal and the internal pudic vessels and nerves, with fat and cellular tissue in greater or less abundance.

71. Lastly, it is pierced, as it were, on the median line by the urethra, the vagina, and the termination of the rectum. Its lower face is lined by an aponeurosis which seems to rise from the great sciatic ligament, and the inner lip of the pubic arch, and the strength of which, although very variable, will be found greatest as it is examined nearest to its origin. A portion of the pelvic aponeurosis covers its upper region, and I think with Camper and M. Désormeaux, that the disposition of the fibrous laminae may exert some influence on the promptitude or tardiness of labour, particularly in women who have never had children.

72. The superior strait is more elevated in the recent than in the dried skeleton, by the entire thickness of the psoas muscles, which, with the iliac vessels, form a sort of column, extending from the sides of the sacro-vertebral angle to the linea ilio-pectinea, so as in a considerable degree to contract the bis-iliac diameter, and also to increase the inclination of the strait very much. Instead of being elliptical, or representing an oval whose large extremity should be turned backwards, this strait is now almost circular, or in the shape of a triangle with the base forwards; the sacro-iliac notches scarcely exist, and the sacro-vertebral angle is much less prominent than is commonly supposed, from the idea formed of it upon inspection of the dried pelvis.

73. From the researches to which I have devoted myself, and whose results have been already made known, I find that the entrance of the pelvis is widest between the ilio-pectineal eminences: at this point its transversal diameter is four inches and some lines, while the bis-iliac diameter, properly so called, is only three inches and a half to four inches. Beneath the promontory and the psoas muscles, the transverse diameter is really five inches, and the concavity of the sacrum gives quite as great a length to the antero-posterior diameter.

74. The bottom of the excavation is of a lozenge shape, with angles corresponding on the one hand to the ischiatic spines, and on the other to the middle line of the sacrum and posterior surface of the pubic symphysis. These four angles indicate the place of union of the four inclined planes, which thus represent four triangles, tending to approach each other at their points.

75. The sacral vessels and plexus, as well as the pyramidalis muscle, are found in the posterior triangles: the anterior planes enclose the internal obturator muscles and part of the levator ani.

The *pelvic fascia* is exactly applied over all these parts; an abundant layer of cellular tissue, in which are embedded the internal iliac vessels, the hypogastric flexus and arteries, a layer which, by the deposition of fat, sometimes becomes so thick as to diminish the cavity, and thus render labour more difficult, lines the whole, and is separated from the viscera by the intermediate peritoneum.

§ IX. USES OF THE PELVIS.

76. The different bony pieces which compose the pelvis are susceptible of only a very slight movement upon each other; notwithstanding assertions to the contrary, the kind of sliding that takes place between the sacrum and coxal bones, as well as between the ossa pubis, in consequence of a fall upon the feet, for example, cannot in any manner be compared to articular motion of whatsoever species.

77. The pelvis is the base of the trunk; it forms a complete ring, the posterior half of which, says M. Désormeaux, supports the entire weight of the body, while the anterior serves as its abutment, so that the weight of the trunk and thoracic members, transmitted through the vertebral column to the sacrum, expends itself first on the ossa ilia, and next on the pubes, which press against each other with more or less force.

78. To the lateral parts of this circle are attached the pelvic members, which in certain postures, in their turn, support the whole of this burthen, whether conjointly or separately. This use of the pelvis, though interesting to the physiologist, is still more so to the accoucheur, for it accounts for the vicious and singular forms that are sometimes assumed by the pelvic cavity, when ossification either proceeds too slowly or retrogrades. Another use of the pelvis is to enclose and protect the bladder, the rectum, the uterus, the tubes, and ovaries. During pregnancy it supports the womb, and maintains it in a proper attitude. During labour it gives passage to the infant by impressing upon it the most favourable direction, and by affording a *point d'appui* to the soft parts of generation.

SECTION 4.

Of the Deformed Pelvis.

79. It would perhaps be more rational not to speak of deformities of the pelvis, until we should come to treat of difficult labour; but the custom of examining them immediately after treating of the natural conformation having prevailed for so long a time, I have not felt myself at liberty to deviate from it.

80. The pelvis is deformed whenever it is sufficiently altered,

either in its natural form or dimensions, to render parturition difficult, dangerous, or impossible. In this view, a pelvis may be mal-formed, although its conformation be regular, and it may have a mal-conformation, although it be not deformed. Nevertheless, these two conditions being almost always united, it has happened that the books have commonly confounded them both together.—Sacombe, it is true, desired to see a distinction made between mal-configuration and mal-conformation; but this distinction, being purely grammatical, has not been adopted, and scarcely deserves to be combated.

81. The direction of the axes and planes of the pelvis, the dimensions of its diameters, and even its form, are doubtless far from being, in all pelves, exactly similar to those I have mentioned above; but a few lines more or less, an inclination more or less decided, a slight mal-conformation, not sufficient to prevent a labour from terminating without danger—it may be conceived that these deformities, properly so called, must be pretty rare.

All deformity of the pelvis may be referred to its excess of amplitude, its narrowness, or the faulty direction of its axes.

§ I. DEFORMITY FROM EXCESS OF AMPLITUDE.

82. It would seem at the first glance, that a very large pelvis ought to be rather advantageous than unfavourable in pregnancy and labour; but observation and reason prove that this is not always the case.

During gestation, the womb being less completely supported may be upset, either backwards or forwards, as long as its dimensions do not exceed those of the abdominal strait,* and it may incline in any direction after the fourth month.

A large pelvis favours the descent of the womb and the prompt termination of labour, and, consequently, exposes the woman to all those accidents which occasionally follow rapid delivery; that is to say, to inertia, inversion of the uterus, and hemorrhage.

I agree, nevertheless, with Madame Lachapelle, that these inconveniences have been exaggerated, that it is generally easy to prevent them, and that the falling of the child, the premature detachment of the placenta, and the rupture of the cord, have perhaps never been produced by this cause rather than by some other.

§ II. DEFORMITY FROM WANT OF AMPLITUDE.

83. It has been incorrectly maintained that the pelvis cannot be contracted in one direction without becoming larger in another, and that, consequently, the circumferences of its straits never vary. Observation has superabundantly demonstrated that in a considerable number of woman, the pelvis retains, after the age of puberty,

* I have seen a retroversion in a young virgin.—M.

most of the characters it had in infancy, and that its form approaches more or less to that of the male ; and so far, its absolute capacity remains less than it ought to be in the normal state.

Besides, since it is fully admitted that there may be excessive capacity, I see not why there should be any repugnance to assert that it may also be too small in all its directions at once ; however, this general and regular narrowness is pretty rare, and I have not yet learned that it has ever involved the necessity of a serious operation.

84. It may be said, therefore, that relative or partial smallness is the only kind that involves real danger ; it is most commonly met with at the superior strait, less common at the perineal strait, and met with still less frequently in the excavation ; it may affect the antero-posterior, transverse or oblique diameters, either taken separately, or several of them conjointly.

85. According to my researches, I find that it most frequently affects the oblique diameters of the superior strait, and more generally one than both of them at once ; shortening of the transverse diameter is the rarest of all, and has perhaps never been met with alone.

86. These different deformities give to the entrance of the pelvis forms as various as they are easy to conceive of. Shortening of the antero-posterior diameter may depend on too great a saliency of the sacro-vertebral angle, and then the strait is cordiform ; if, at the same time, the symphysis of the pubis is driven backwards, the pelvis exhibits the appearance of the figure ∞ , lying in a horizontal position. When both of the oblique diameters are affected, the bodies of the pubis, by approaching the promontory, may, if there be no derangement of the symphysis, give to the strait the shape of a triangle, a trapezium, or a trefoil, according as the ends of the bis-iliac diameter shall form angles more or less acute or rounded. These pelves, which have been denominated trilobated or trifoliated, also present this peculiarity, that the three segments are sometimes equal, while at other times the anterior portion, or the right, or left, is much smaller than the other two. It may also happen, that the two acetabula may tend to approach each other, in proportion as they approximate towards the sacrum ; the pubes in this case, bent at a right angle to the ileo-pectineal eminences, project from one inch and a half to two inches in front, become parallel to the antero-posterior diameter, and have between them a space of only a few lines. The figures of two pelves of this sort may be seen in a dissertation by Weideman. Madame Boivin has given a design of one that belongs to the same category ; but the most extraordinary one is that belonging to M. Jeuffrion, and a model of which in plaster was deposited by M. Maygrier in the Museum of the *Ecole de Medecine*. In this pelvis the two pubes proceed directly backwards to the points where they unite with

the ilia, that is, to the extent of a full inch and a half; near the acetabula, as well as immediately behind the symphysis, the interval between them is only three lines; all this portion, therefore, is completely foreign to the circle of the strait, and the antero-posterior diameter measures in reality only two inches and a half, instead of five, as would have been supposed had it been measured externally during life.

87. When only one of the oblique diameters is deformed, it commonly produces a disposition that it is highly important to notice. If, for example, the contraction occurs on the right side, the left may present an excess of amplitude. In this case, it is clear, that if the head presents with the occiput turned to the right, the labour might not come to a conclusion without assistance; whereas if it had presented to the left, nature would have sufficed for her own relief. This remark indicates with sufficient clearness, that in order to procure an easy delivery for a woman with such a conformation, it is only necessary to turn, and bring down the child in the first or second position of the feet; so that the occiput may correspond to the largest side of the strait. It also explains why a woman who has been spontaneously delivered of her first child, may not perhaps get through, in a second labour, without symphysiotomy or the Cæsarian section, and *vice versa*.

88. In 1825, I was requested to attend a woman who had been in labour for two days; the head would not engage; I sought for the feet, and terminated the labour. In 1826, the same woman was brought to the *Hospital de la Faculté* having been four days in labour. The waters were gone off, and the head was strongly engaged; the womb, being very closely applied to the fœtus, would not allow the operation of turning; the application of the forceps was attempted by MM. Désormeaux, Deneux and myself, but nothing could induce the head to descend. This woman, who became pregnant again in 1827, gave me timely notice when her labour came on; I felt for the feet, and every thing was promptly and happily terminated. The different issue of these three labours depended upon this, that in one case, the back part of the head presenting to the right, where the pelvis was greatly contracted, could not pass through the strait, while in the other, by turning the occiput to the left, where the natural dimensions were preserved, the passage of the head was not impossible.

89. Unless the sacrum itself be contracted, it is rarely that a lessening of the transverse diameter of the abdominal strait is capable of interfering with the escape of the child. There are almost always to be found more than four inches between the iliac fossæ, and this kind of deformity only occasions an increase of sacro-pubal diameter, by giving to the strait the form of an oval, or a greatly elongated heart.

90. Sometimes the narrowing affects only one side of the pelvis,

as is seen in a specimen in the museum of the *Faculté*: in that case the deformity comprises both the greater and lesser basin.

91. All these deformities may be combined in various ways, or exist singly, and in very different degrees. Charles Bell tells us that in the pelvis of a woman who had been long affected with osteo-malacia, there remained a space of about three lines only in the antero-posterior diameter, and only about half an inch betwixt the iliac fossæ.* Baudelocque cites a case in which there were only nine lines from the sacrum to the pubis. A contraction almost as great as the one just mentioned, is observable in a specimen that I saw in the *Museum de l'Ecole de Medecine*; however, any body can understand how many shades there may be between these extreme contractions and the normal dimensions of the pelvis.

92. The inferior strait is perhaps more frequently enlarged than contracted; when the base of the sacrum is depressed towards the pubis, or the pubis driven backwards towards the sacrum, it almost always is in the direction of a see-saw movement, which separates the coccyx more or less from the top of the pubic arch. Although it may be laid down as a general rule that the inferior strait enlarges while the superior strait contracts, it is, nevertheless, possible that they may both be narrowed at the same time, and that, too, in their corresponding diameters.

93. The approximation of the tuberosities of the ischia towards each other, too great a straightness, or a triangular form of the pubic arch, coinciding almost always with a *long* symphysis pubis, gives birth to what is called *barrure*, the most common and dangerous of all the deformities of the perineal strait; for as the fœtal head must pass through the pubic arch, rather than behind the ischia where the soft parts arrest it, the *barrure* renders the delivery extremely difficult; the retroversion of the coccyx does no good in this case, and if the child is born at last, it is at the expense of an extensive laceration of the perineum.

94. The coccyx, also, very often becomes almost horizontal, and may, by rising upwards, more or less affect the coccy-pubal diameter, especially where the base of the sacrum is thrown back. It also pretty frequently happens that one of the ischia with its ramus inclines towards the centre of the strait, while the opposite ischium and the coccyx do not alter their position. In fine, the varieties of form are here less numerous than in the superior strait; but the degrees of contraction should be understood in the same manner.

95. Faults of the excavation coincide almost always with the

* In a woman who had already had six children, M. Nægele saw such a deformity of the pelvis as to leave only two lines on the left, and six lines on the right between the fourth lumbar vertebra and the superior brim of the symphysis pubis.

contractions of one or the other strait, and sometimes with both of them simultaneously. They depend either on too great, or on an insufficient curvature of the sacrum.

96. In the former case the bone is bent, as it were, upon its anterior face, and the sacro-pubal or coccy-pubal diameters are to a greater or less degree diminished, while the antero-posterior diameter is found to be larger than natural; in other instances, although very greatly curved, it is not the less removed to a great distance from the pubis, whether at its base or apex.

In the second case, the anterior face of the sacrum being actually plane, or even slightly convex, as may be seen in a specimen belonging to the collection of the *Ecole*, the pelvic cavity, instead of dilating betwixt its straits, becomes smaller, or on the other hand, it enlarges regularly, from the promontory to the point of the coccyx; according as the base of the sacrum seems to have see-sawed forwards or backwards.

97. When the sacrum is too concave, and when both the straits are narrowed, if the head, by means of great efforts, comes down to the excavation, it stops there, becomes locked, can neither advance nor retreat, and renders the labour so dangerous that even the Cæsarian operation itself might be insufficient for its termination. If it be too straight, and the lower strait is too much contracted, the head will descend at first very promptly, but as it passes through a conical canal, it will soon be arrested, and with difficulty clear the apex.

98. Whenever narrowness of one of the straits coincides with excessive amplitude of the other, the progress of the labour is necessarily perplexed. Is the abdominal strait faulty through insufficient amplitude? the head will long remain arrested at it, but will pass through at last; then, meeting almost no resistance, it will traverse the apex of the pelvis with great celerity, at a moment perhaps when the accoucheur, judging of the duration of the labour by the time that has been already occupied, is informing the assistants that several hours must elapse before it can be concluded. Has the inferior strait, on the contrary, lost its dimensions? the fœtus engages with extreme quickness, and the practitioner, who does not suspect the real condition of the pelvis, announces that the woman will speedily be relieved, whilst perhaps the very best planned succours are becoming indispensably necessary.

99. If the symphysis pubis forms a crest projecting backwards a few lines, as I have seen it do in two instances, it does not prevent the delivery from being accomplished; but during the passage of the head it may contuse the bladder and the uterus, and favour the laceration of these organs. Sometimes one of the acetabula projects into the excavation, or it may be one of the sciatic spines, turned very much inwards, that deforms the cavity, as was ob-

served both by Levret and Madame Lachapelle; exostoses of every sort and shape have been met with; scirrhus, fibrous tumours, &c., may also be developed so as to interfere with parturition; but it must be acknowledged that a majority of the faults of the excavation depend upon too great or too small a curve of the sacrum.

§ III. FAULTY DIRECTION OF THE AXES.

100. Nearly all these faults of conformation change, to a greater or less degree, the planes and axes of the pelvis. When the sacro-vertebral angle projects too much towards the pubis, the hollowness of the lumbar region being necessarily augmented, it happens that the angle between the spine and sacrum, instead of being one hundred and thirty-five degrees, may yield only one hundred and thirty, or even one hundred and twenty degrees; the axis of the superior strait, therefore, inclines forwards, and approaches the horizontal line; if the coccyx and the point of the sacrum, restrained by the sacro-sciatic ligaments, are not drawn away by this see-saw, the plane of the inferior strait is depressed to the level, or below the level of the horizontal line, and may even become parallel to the plane of the superior strait, which in some measure justifies the opinion of Messrs Sæmmering, Carus, Nægele, &c., who think that even in the natural strait the perineal strait inclines downwards and not upwards. But this disposition, far from bringing the axis of the apex of the pelvis towards the perpendicular, or, from inclining it backwards, as at the first glance might be supposed, carries it, on the contrary, considerably in front, inasmuch as the anterior face of the coccyx must determine its direction. When the pubis rises and the promontory becomes obtuse, the axis of the superior strait approaches towards the vertical line, and in some cases becomes parallel to the axis of the trunk of the body; if, in this case, the posterior wall of the excavation fails in being sufficiently concave, the two pelvic axes may become parallel, although the plane of the inferior strait be much inclined forward. This conformation, which especially favours the laceration of the perineum, gives rise, during labour, to difficulties that have not been sufficiently dwelt on in our classical works, and to which M. Lobstein endeavoured to direct the attention of the profession in 1817.

§ IV. CAUSES OF DEFORMITIES OF THE PELVIS.

101. In order correctly to understand the causes of faulty conformations of the pelvis, it is right to study them as they act in infancy, during puberty, or at the adult age. Until the sixth or seventh year, they are very well explained by a reference to rachitis, which is almost the only cause of them. The bones that are chiefly affected in this disease, being constantly pressed between

two opposing forces, must give way in that direction in which the strongest force operates, or towards the point where there is the least resistance.

102. Thus, admitting that the softening of the bones is everywhere equally great, that the child is standing on its feet, and rests with the same pressure on both legs, it is evident that the base of the sacrum will be depressed towards the pubis, and the cotyloid cavities will be pushed upwards towards the promontory. Hence, there will be shortening of the sacro-pubic, as well as of the oblique diameters: if the child stands on its feet, but leans more on one foot than on the other, the oblique diameter of one side only will be contracted; if he remains seated, the hollow of the sacrum will become deeper, while the antero-posterior diameters of the two straits will be lessened; if he be habitually laid upon his back, the curve of the sacrum, instead of augmenting, will disappear, as well as the pelvi-vertebral angle, and the coccy-pubic diameter will generally lose somewhat of its dimensions; a lateral posture will influence the transverse diameters, &c.

103. Although the weight of the body then will account for most of the vicious forms of the pelvis, it must, nevertheless, be admitted that their production is in certain cases singularly favoured by the active power of the muscles that surround the coxo-femoral articulation; so much the more, as the bones, most commonly softened only at some particular points, retain everywhere else all the solidity that is desirable.

104. After the first periods of childhood, the deformities of the pelvis are almost always the result of a disease, as that *malacosteon*, either general or partial, which is so common in England, of osteo-malacia, of irregular action of the muscles, and of bad habits in respect to attitude. It is thus that young girls, who, for the purpose of increasing the prominence of their hips and the depth of the lumbar hollow, keep the pelvis and head thrown strongly backwards while they project the abdomen and breast as far forwards as possible, never think that for the purpose of obtaining some elegance of form, they run the risk of being never able to become mothers, without exposure to the greatest danger.

105. In a diseased hip joint the head of the femur has been seen to push the bottom of the acetabulum into the pelvis, and even to pierce through the acetabulum. Madame Lachapelle gives the case of a woman who was affected with a spontaneous luxation of the thigh bone, and in which the false acetabulum projected so far into the pelvic excavation as to interfere with the labour; the amputation of a thigh, but not of a leg, in an adult woman, and *a fortiori* in a young girl, is also capable of vitiating the pelvis, and in the following manner:—The artificial limb, being obliged to bear upon the ischium, the acetabulum of the sound side has alone to support the weight of the body. Now

the laws of mechanics teach us that in this state of things, the oblique diameter corresponding to the natural limb may become contracted so much, as to render delivery dangerous, as has been proved by the observations made by D'Herbinioux and Madame Lachapelle.

106. Fractures and luxations, unequally consolidated, caries, syphilis, &c., have also sometimes given rise to obstacles to parturition. To recapitulate, it may be said that rickets almost always occasions deformed pelvis in young children, for at that age the members, of which the coxal bones constitute a part, generally participate in the diseased condition; while later in life, as for example, at the approach of puberty, as osteo-malacia almost solely affects the spinal column, the curves of the spine may be carried to the greatest extent without the pelvis, in reality, suffering any change. For further details on this subject the reader may consult, with advantage, the works of M. Portal, of Choulant, Shaw, Bamfield, of MM. La Chaise, Pravaz, &c., on spinal deformity and the diseases of the spine and pelvis.

§ V. OF THE MENSURATION OF THE PELVIS.

107. When called upon to ascertain the state of a woman's pelvis, we ought to begin by interrogating the parents, or persons about her, as to the manner in which her childhood had been passed; whether her first steps were slow and difficult, and whether she remained for a long time weakly; when we learn that the joints had been large and as if swelled; that she had been rickety or phthisical, we may infer that rachitis had existed, and that her pelvis is probably deformed. We should next examine very attentively the other parts of her body, and if there be any preternatural curve in the spine, if the knees are large and turned inwards, if the lower jaw projects too much forwards, if the teeth are bluish and exhibit transverse striæ, the same inference may be drawn; while we may suppose the contrary if none of the above circumstances should exist.

108. The theory of *homologues*, a theory which, as is well known, teaches that, in animals, not only is the right side an exact repetition of the left, but also that the lower half of the trunk represents the superior half; that the anterior half encloses the same elements as the posterior, has very naturally given rise to an idea, that the pelvis ought only to be a repetition of the head. In Germany, therefore, where this doctrine has numerous partisans, there appeared some years since a work in which Dr. Weber endeavoured to demonstrate that the head and the pelvis are subject to the same laws of evolution; that the good or bad conformation of one of these parts always corresponds exactly with a similar state of the other; that the narrowness and depth of the male pelvis, for example, are in exact accordance with the form of the male head,

whose vertical and antero-posterior diameters, in general, exceed the transversal, while the opposite condition is observable in the female, &c.

109. Consequently, M. Weber desires that the inspection of the head should give us an exact idea of the condition of the pelvis. His method is very simple: the occipito-frontal, bi-parietal, and fronto-mastoid diameters of the head, exactly represent the sacro-pubic, bis-iliac and oblique diameters of the pelvis.

The superior strait is proportioned to the cranium, and the face is proportioned to the inferior strait.

Although M. Weber cites cases in support of his system, I am obliged, nevertheless, to say that I have seen the very best shaped pelvis coincide with the most deformed crania, and vice versa; however, it appeared to me as it did to Madame Lachapelle, that the more the upper part of the face projects, the larger is the pelvis.

110. These preliminary researches being completed, we pass on to the examination of the pelvis itself, with all possible decency and circumspection. If the woman's gait is easy, free and unconstrained; if the hips are on the same level, wider than the base of the thorax, and well rounded, the great trochanters properly separated from each other; if she is not hollow backed; if the sacrum has neither too much nor too little convexity; if the symphysis of the pubis is neither sunk in nor protuberant, nor too long, there will be some good reason for reporting a good conformation; by placing the fingers between the labia and the root of the thighs we can ascertain whether or not the pubic arch is narrow, whether it forms a sufficiently large arch of a circle, and whether the ischia are too near each other.

111. It is not necessary, for the purpose of correctly appreciating all these circumstances, to uncover the woman, or to make her lie down; if there be any fear of alarming her modesty, the examination may be made through her chemise. When all the characters of a good conformation are met with, it is common to dispense with any farther examination; but if some of those characters be wanting, we should endeavour to determine the kind of deformity that does exist: a hollow back, with a very decided saliency of the pubis, indicates an extreme degree of inclination, and a trilobated form of the superior strait. If the symphysis be at the same time depressed, we may affirm that the sacro-pubic diameter is shortened, and that the strait is bilobated, or of the figure of an ∞ . Hips uneven or too much elevated, and depressed external iliac fossæ, disclose a fault of the bis-iliac diameter. The approximation of the ischia, the convexity of the sacrum, and the forward inclination of the coccyx need only to be hinted at to render it easy even to the least skilful person to recognize them in an instant.

112. As it is essential to the happiness of families that we

should arrive at mathematical results, and as the employment of the hand yields them only in a vague and approximative manner, the accoucheurs have invented an infinity of instruments for the purpose of exactly measuring the pelvis, whether externally or internally; these instruments are called pelvimeters or mecometers.

113. Only two of them can be applied externally; one, the (*compas d'épaisseur*) calliper of Baudelocque, which is almost exclusively employed, on account of its simplicity; and the other, the mecometer of Chaussier, which is scarcely used except at the Maternité of Paris. The calliper serves to measure, 1. The sacro-pubic diameter, by placing one of the buttons in front of the symphysis pubis, and the other on the first spinous process of the sacrum; 2. The oblique diameters, by placing one of the ends of the calliper on the external surface of the great trochanter, and the other on the projecting portion of the opposite sacro-iliac junction. In the first situation, the cursor must measure seven inches; so that by deducting two inches and a half for the sacrum and half an inch for the pubis, there may remain four inches for the antero-posterior diameter of the superior strait. For the oblique diameters, it should measure nine inches, for we must deduct two inches and three-quarters for the trochanter, the neck of the femur and the acetabulum, and one inch and three-quarters for the posterior symphysis.

114. Baudelocque has asserted that the thickness of the bones rarely varies more than one or two lines in the antero-posterior diameter, and that the results obtained by the calliper may be relied on. Madame Lachapelle, on the contrary, regards this mode of proceeding as very deceptive, and thinks the thickness of the sacrum may vary from four to five lines. Madame Boivin goes still farther, for she says the thickness indicated by Baudelocque, varies from four to twelve lines. One thing is certain, that leanness or fatness does not diminish or increase in a sensible degree the thickness of the soft parts on the points to be touched by the instrument, and that the differences of thickness of the sacrum and pubis mentioned by Mesdames Lachapelle and Boivin, are at least extremely rare.

115. As to the measurement of the oblique diameters, the length of the neck of the femur has appeared to vary too much to permit practitioners to repose much confidence in it; but I think on this subject there has been a very general misapprehension; for among a pretty considerable number of well-formed pelves I have never found in this direction a difference exceeding a quarter of an inch, more or less, than the one indicated.

As the cristæ of the ilia may be considerably raised or much depressed, without the straits having undergone any modification, we should be exposed to too many and too serious mistakes, were we to take half the distance between them as the measure of the bis-

iliac diameter. This last is surrounded by too many muscles, and moreover is of too little importance for us to measure it in any other way than with the hand.

116. The fingers suffice for ascertaining the state of the inferior strait. According to the authors, the woman should be seated upon the edge of a chair, but she may also be examined while standing up. The ball of the fore finger is placed upon the point of the coccyx, and the point of the thumb on the edge of the sub-pubic ligament, after which the two fingers, being held at the same distance apart, are referred to a graduated scale to ascertain the degree of separation. While the extremity of the index is pressed against the point of the coccyx, the radial edge of the finger, instead of the thumb, may be pressed against the top of the pubic arch; but there is more danger in this method of painfully pressing against the external sexual organs, if their sensibility happens to be excited. To measure the ischiatic diameter, we must press the points of two fingers against the lips of the ischia, at the spot where the great sacro-sciatic ligament is inserted, taking care to push the fat aside by gentle pressure.

117. Although it is true that this exterior exploration does not enable us to pronounce with confidence as to the nature and degree of deformity of the pelvis, it is nevertheless the only one we can have recourse to in virgins; in other women it is permissible to attempt the internal mensuration, which it has been proposed to perform in a great many different ways.

118. Coutouly was the first to propose measuring the interior of the pelvis by means of a *pelvimeter*, which bears his name. It is impossible to convey a clearer idea of such an instrument, frequently modified by its inventor, than by comparing it to the shoemaker's rule employed in measuring the length of the foot. It is introduced, closed, into the vagina, after which it is opened, and one of its branches rests against the pubis, while the other is applied to the sacro-vertebral projection. Now, the movable or sliding branch being graduated externally, it is easy to estimate the distance that separates the two vertical pieces. In this manner we can measure the sacro-pubic diameter with the most rigid exactness on the dried pelvis, but in living women, Coutouly's instrument is rarely applicable, except in the case of pregnancy; it is not so, however, in a woman in labour, if the summit of the head be engaged in the strait; besides, when it can be made use of, its introduction must always be very painful, and its results will be most generally fallacious. This pelvimeter, therefore, deserves the neglect into which it has sunk. Many accoucheurs have endeavoured to find a substitute, but as those they have proposed have not fulfilled the ends intended by their authors any better than Coutouly's, they have been quite as little employed as his. The thimble with which Asdrubali armed the fore finger, in

order to increase its length ; the sort of foot rule, in the shape of a compass or pincers, with branches of unequal lengths, which can be opened in the pelvis ; those made with the arms straight, hollow, or full and graduated, according to the plans of Stein, Creve, and Aitken, afford us results not at all more precise than the others.

119. The internal mensuration may be well effected by the fingers or hand. When the woman is not in labour, or when the head is not as yet engaged, the point of the fore finger may readily be carried to the promontory : the root of the finger is then raised up against the arch of the pubis, and the place where it touches is marked with a finger nail of the other hand. Nothing can be easier after this than to ascertain the distance from pubis to sacrum. Unlike other pelvimeters, the finger is a *feeling* instrument, the point of which will not slip away from the promontory of the sacrum without the operator knowing it ; thus one of the most frequent causes of error is at once obviated. It is true, that as the line represented by the finger falls below, and not on a level with the top of the symphysis, as it ought to do, we commonly find the length greater than it ought in reality to be, but by subtracting four or five lines on account of this obliquity, we shall have for the remainder pretty exactly the measurement of the space between the sacro-vertebral angle, and the top of the symphysis pubis. There are two circumstances, however, that may easily lead us into error. The first is where the upper edge of the symphysis seems to have fallen backwards ; and the second, where the contrary obtains. Here, indeed, the antero-posterior diameter of the superior strait, might appear very great, although in fact it were very small, and reciprocally. But the application of the calliper externally would readily correct the mistake likely to arise from such a disposition of the bones.

120. During labour, we can, if needful, pass the whole hand into the vagina ; the thumb and forefinger are then separated, so as to place one on the sacro-vertebral angle, and the other behind the pubis ; the hand is withdrawn in that position, and we can, with the assistance of a foot-rule, determine, within one or two lines, the dimensions of the sacro-pubic diameter, without having recourse to the loop of thread proposed by Storck, the armed hand of Koep, or any other of the thousand inventions for that purpose. Instead of using the thumb and index finger, I have sometimes availed myself of the index and medius fingers passed high up into the vagina ; after having separated them as far as possible, and placed the points of them on each extremity of the diameter, which it is designed to measure, two fingers of the other hand are to be placed between their roots in order to keep them apart, and then they should be withdrawn from the female organs.

121. With the finger we have the advantage of appreciating

all sorts of deformities of the pelvis, whatever be their seat, their nature or degree, the straightness of the sacrum, as well as excess of its curve; also, exostoses and tumours of whatsoever nature, the transverse as well as the antero-posterior diameters. By pressing with a certain degree of force against the point of the coccyx, it is possible even to learn how much may be gained in the coccy-pubic diameter, by the retreat of the coccyx backwards. Those who have objected that the finger is not always long enough to reach the angle of the sacrum, have forgotten that a pelvis, in which the forefinger cannot reach to the promontory, is thereby proved to be so spacious, that the accoucheur need not trouble himself to examine it any farther. Moreover, it cannot be denied that, although it is never very difficult to discriminate between a deformed pelvis and one that is not so, it is nevertheless impossible, in certain cases, to determine the exact nature and degree of each particular deviation; it is therefore no more than right to give the praise they deserve to the efforts lately made by Madame Boivin to obtain more precise results: the instrument which she has invented, and which she has named *intro-pelvimeter*, although founded on the same principles as Coutouly's, differs from it, nevertheless, very considerably. As its branches are separately introduced, one into the rectum, and the other into the vagina, and as the curve of the rectal branch is very deep, it may be used in the virgin as well as in the pregnant woman, and at any stage of labour; it may even be employed in ascertaining the oblique and transverse diameters, and by altering its vaginal branch it could easily be converted into a calliper. Nevertheless, I doubt we shall not be able to obtain from this apparatus such exact results as its inventor seems to hope for.

122. However multiplied the means of measuring the pelvis, it must have been seen from the foregoing, that even the most skilful accoucheur will never be able to attain to the mathematical precision that is desirable; but is this a reason for rejecting them entirely, and asserting with Puzos that the operation itself is of no use? This author, otherwise so correct, has assuredly gone too far, in saying that a young woman ought to be forbidden to marry, if she had ever been affected with rickets, or if she have a spinal deviation, and humanity and justice both appeal from his judgment. How many ill-shaped women bring large robust children with the greatest ease into the world? Another serious inconvenience might attach to such a general proscription: many women would pay no respect to the prohibition, and not be slow in convincing themselves that they had been frightened with dangers wholly chimerical. Hence, what almost always occurs when the effect does not follow the threat, those who run some risks upon being married, and those who run no risks at all, would equally turn a deaf ear to advice. On the other hand, it would be absurd

to deny the importance of pelvimetry, in labour, when a decision must be made between embryotomy, and the dangerous operations that may be performed upon the mother. Finally, by citing, for the purpose of proving the uselessness of pelvic mensuration, the cases of women who were not afraid to become pregnant again after having once undergone the Cæsarian operation, Puzos seems to me to have misunderstood their true position: is it really the attraction of pleasure that always induces them to yield to the brutal husband that the law has given to them? is it fair to compare a woman who fears above all things to lose the affections of a man to whom she is united for life, to a young girl, who, free from all entanglements, ought to think first, and above all, of her own safety?

ARTICLE II.

OF THE SEXUAL ORGANS.

123. In women, as in men, the organs of reproduction are partly enclosed within the pelvis, and partly exposed on the exterior surface of that cavity.

SECTION 1.

Of the External Parts of Generation.

124. Under the title of external* genital organs are generally comprehended the mons Veneris, the vulva, and the perineum.

Mere appendages of the internal organs, these parts perform only a secondary office in the great generative function; but during the expulsion of the ovum, they undergo changes and are exposed to dangers, which render the exact knowledge of them very useful to the physician-accoucheur.

§ I. OF THE MONS VENERIS.

125. The Mount of Venus (*the sur-pubal eminence, pubes*) is a

* The external genital organs consist of the *mons veneris*, the *labia externa*, the *superior* and *inferior commissures*, the *clitoris*, the *labia interna* or *nymphæ*, the *vestibule*, the *meatus urinarius*, with the canal of the *urethra*, the *perineum*, the *fourchette*, the *fossa navicularis*, the *hymen* in virgins, and the *carunculæ myrtiformis* in matrons. The internal organs include the *vagina*, the *uterus*, the *Fallopian tubes*, the *ovaria*, and the *ligaments*.—H.

sort of relief formed by the soft parts that cover the front of the pubis; it is principally composed of fat, fibrous filaments, and cellular tissue. In fat women it is sometimes separated from the belly by a transverse groove of considerable depth; the degree of its projection also varies on the same account, but much more on account of the projection of the bones which support it being different in different subjects.

126. The skin that covers it is very thick, elastic, not very extensible, and covered with hair in the adult; it contains a great number of sebaceous follicles, and the whole represents a sort of cushion, the uses of which are, according to many authors, connected with the business of copulation. The composition of the mons Veneris very fully explains the violent pain which accompanies phlegmonous inflammation of the part, and enables us to comprehend why abscesses formed within it should be promptly opened.

§ II. OF THE LABIA (*labia pudendi externa*).

127. A sort of cutaneous folds which seem to result out of the bifurcation of the lower part of the mons Veneris, the two labia separate farther and farther from each other, for about half their length, and then approach to be united again about an inch in front of the anus, exhibiting two commissures, one superior or pubic, the other inferior or perineal. The external surface, formed by the skin of the thighs, is, like the pubes, covered with hair, at puberty. Their internal surface is smooth, glabrous and of a rose colour; a considerable number of sebaceous or mucous follicles are observed upon it. The accoucheur ought to be aware that the matter furnished by these follicles may become acrid, and irritating to such a degree, as to give rise to a discharge that has often been mistaken for blennorrhagia, particularly in uncleanly women.

In young girls, the thickness of the labia is greater above than below. In women who have borne children the contrary commonly obtains. Moreover, before the age of puberty, they are very close together, and pretty firm. After marriage they separate from each other, become flaccid, bluish, and lose the regularity of their form.

Composed, like the mons Veneris, of filamentous cellular tissue and fat, they are also, like it, subject to phlegmonous inflammation, attended with violent pain, and which ought to be opened early, taking care to plunge the instrument to a considerable depth if it is desired to avoid relapses and sinuses.

128. As the tissue of which they are composed is much looser than that of the mons, and they are exposed to more friction, they are subject not only to purulent collections, but also to bloody

extravasations, serous effusions, &c., which may acquire a considerable size.

129. The great labia* may also become the seats of hernia, and other tumours, which should not be confounded with those above mentioned. The slit which they circumscribe, and which is placed in the direction of the coccy-pubic diameter, is called the *vulva*, while the whole of the external genitals is specially designated by the word *pudendum*. This slit contains several parts, situated in a direction from above downwards:—these are the lesser labia and the clitoris, the vestibule, the meatus urinarius, the vulvar orifice of the vagina, the hymen, the fossa navicularis, and the fourchette.

§ III. OF THE LESSER LABIA (*labia pudendi interna*).

130. Thus denominated because they are, in fact, much smaller than the preceding, known also as the *nymphæ*; the lesser labia have been compared to a young cock's comb. They arise, superiorly, by two branches, which are continuous with the prepuce of the clitoris: they then descend, divergingly, on the inner face of the greater labia, and terminate insensibly about the middle of these latter, opposite to the orifice of the vagina. They are of a firm consistence, and a reddish colour; they are formed of a tegumentary fold of a mucous character, very delicate, and very sensible, and also of an erectile or spongy tissue, very closely resembling that of the corpus cavernosum in men.

131. At birth the nymphæ generally protrude beyond the level of the greater labia; in young virgins, on the contrary, the labia almost entirely conceal the nymphæ; and in adult women who have had children, the lesser labia again become very salient, while they lose their firmness and their rosy hue.

132. In this respect numerous varieties are to be observed; sometimes, indeed, their appearance undergoes no alteration; at other times they acquire a considerable length, either as regards their whole extent, or only near their posterior extremity. This hypertrophy, which is in some cases natural, but most commonly accidental, is sometimes carried to such an extent as to interfere with coition; so that it was formerly not uncommon to amputate the nymphæ. In some countries they are, naturally, much longer than in our European regions. In Persia and Turkey, for instance, if we may believe the reports of travelers, it is frequently found necessary to excise them.

133. From the time of Kolbe all the naturalists have spoken of a peculiar fold, known as the *Hottentot apron*, and on which

* The labia are sometimes enlarged by varicose veins. They are also the seat of pruritus, of morpiones, and of herpes.—H.

Tackard, Sparman, Banks, Peron, Le Vaillant, Lesueur, and several others have emitted very different notions. Evidently depending on the prolongation of the lesser labia, as was seen by Ten Rhyne, it is not among the civilized Hottentots that it is met with, but among the savage tribes of the environs of the Cape, discovered by the Dutch, who call them *Bosgismans* or *Bochismans*, that is to say, *Bushmen*. On this subject no further doubt can be entertained, since an individual of this species came to be exhibited at Paris, under the title of the *Hottentot Venus*: in fact, the drawing of it furnished by M. Flourens, and the descriptions published by MM. Cuvier and Virey, show that, instead of being three or four lines, the nymphæ of this woman were several inches in length. It is true, there is a wide difference between these dimensions and those attributed by certain travelers to the *Hottentot apron*; but it is easy to conceive of an extent of six or eight in an organ which has been seen actually to measure three inches, provided if, by means resorted to in that country, they are subjected to continual tractions, always increasing in force, from childhood up to adult age.

134. The uses of the nymphæ are little known; the ancients believed that they served to direct the course of the urine, whence their name of nymphæ. Smellie, and all the writers who have followed him, pretend that they unfold or disappear in labour so as to favour the enlargement of the vulva; but this assertion is wholly false; it is said, lastly, that being endowed with an exquisite degree of sensibility, their use is to augment the pleasure of the venereal act.

§ IV. OF THE CLITORIS (*coles feminarum*).

135. The clitoris is a tubercle which authors have compared to the uvula, and which represents, on a small scale, the penis of the male. In the clitoris are distinguishable a loose extremity, round, and of an acorn shape, and a body which is attached by two roots to the ischio-pubic rami; but it has not a canal as is the case in the male yard. A fold of skin covers it, serves as a prepuce, and then proceeds to disappear in each of the lesser labia, of which it seems to be the root.

136. During the first months of uterine life, the clitoris is as long and large as the penis; at birth its dimensions are still considerable. But from that time it ceases to grow, if it does not even diminish, so that at the age of puberty it is in general not more than four or five lines in length. There are, however, some women in whom it obtains a much greater development. It has been, on some occasions, seen to reach the length of from one to five inches; in such cases it scarcely differs from its analogue in the other sex.

137. Such a disposition as the above, is further remarkable, inasmuch as it coincides with certain characteristics which have

even led to the belief that individuals of such conformation belonged to neither sex peculiarly; that is to say, these women generally have very small breasts, hard features, a beard, and a temper which leads them to prefer labour and occupations foreign to the pursuits of the sex. They are stout women,* and are fond

* An interesting case of this kind came under my own observation, while I resided in Chester county. A child was born of doubtful gender. After the nurse had finished washing it, she called together the gossiping females, who were present, to inspect an unusually large clitoris, and to decide the infant's sex. The little stranger being carefully examined, was pronounced a female, and called Elizabeth. As she advanced in years, the clitoris developed rapidly, and, in appearance and size, resembled the *penis masculinus*. She grew robust also; assumed a masculine resemblance; delighted only in manly sports and the labours of the field. At eighteen years of age, she was nearly six feet high, and of vigorous proportions; moustaches began to grow upon her upper lip; and she reversed the decision of the gossips who attended her birth; exchanged the female attire for man's apparel, and her name, which was Elizabeth, for Rees; and threatened summary vengeance against any person who should venture, from that time, to speak of her as a female.

She now abandoned all the duties of a female, and was employed only in the out door labour of a farm, such as ploughing, reaping, mowing, &c.

She never menstruated; and, at five and twenty years of age, had a very strong beard; was industrious and enterprising, and increased rapidly in wealth, mainly, by the purchase and sale of farm stock. Being remarkably athletic and impetuous in her temper, she was the terror of the whole neighbourhood; in personal conflict always victorious; and at fisticuffs "*a regular bully*."

About this period she purchased a large and fertile farm in the Great Valley, and married a woman whose name was Elizabeth. In the married state she manifested some affection for her companion, and professed to have great enjoyment in the sexual embrace, the clitoris having now attained the enormous length of six inches. A fact which proves that the clitoris is endowed with a high degree of erotic sensibility.

It is superfluous to say that there could be no offspring; indeed, she often said to her companion, "I have no generative powers, and if you ever become pregnant, I will put you to death."

This extraordinary female lived until she was upwards of fifty years of age, and died in possession of a large estate, which she had accu-

of procuring illicit enjoyments with persons of their own sex. In a word, such are the individuals who have generally given rise to the questions relative to hermaphroditism.

mulated by industry and enterprise ; and came to an untimely end, as I believe, by arsenic administered by the hand of her treacherous companion. She approached the period of her dissolution, however, in the full possession of all the faculties of her mind, and, before she expired, directed a faithful old male servant to lay her out after death, and not to allow any person to be present during that process, neither to remove the pantaloons and shirt she then had on ; but to put clean ones over them, and to remember that it was her dying injunction, that no examination should be made of her person after death, by any physician.

The servant, faithful to her last request, positively refused me the privilege of making a post-mortem examination, or of even inspecting the genital organs. From all I could learn, indirectly, from her early friends and from her partner, she differed from other females, as to genital structure, in nothing but in an hypertrophied clitoris ; and that she urined in the usual female posture.

This anomalous case not only strengthens the hypothesis that the clitoris is mainly the seat of erotic enjoyment, but corroborates an opinion I have long entertained, that the female is greatly indebted to the menstrual function for the delicacy of her beauty, and the effeminacy of her character.

Females who menstruate with difficulty, or who do not menstruate at all, are generally annoyed with moustaches upon the upper lip, or with strong and unsightly beards extending over the chin, and are often fat and gross, having a general masculine resemblance.

The female beard is, indeed, so connected, in my mind, with dysmenorrhœa and amenorrhœa, that the presence of the moustache is now presumptive evidence of the one or the other disease. Imperfect menstruation often arises from defective ovaries, and hence females thus affected, rarely bear children. Besides, defective ovaries in the female, and the removal of the testes from the male, cause the two to assimilate in voice, in manner, and in general appearance. What traveler has ever heard a eunuch sing without being struck with the feminine sweetness of his voice !

This hypothesis is more strikingly illustrated in animals. The *bull* and the *cow* have a very different general aspect ; but the *spayed heifer* and the *steer*, when fully grown, are precisely alike in size and general appearance. In the spayed sow and barrow, the assimilation is equally striking.—H.

138. Such is the intimate structure of the clitoris, that during coition, the blood accumulates within, swells it, and occasions its erection; the delicate membrane that invests it, being of the same nature as that of the nymphæ, and very sensitive, it has in consequence been concluded, that with the nymphæ it is the chief seat of venereal pleasure. The clitoris rarely exhibits any morbid affections; but as its size, when excessive, may incommode during copulation, and as its uses are not very essential, it has, in several instances, been subjected to the operation of amputation.*

§ V. OF THE VESTIBULE.

139. Circumscribed by the clitoris, the inner face of the nymphæ, and the meatus urinarius, the *vestibule* is a small triangular space, depressed, corresponding to the upper part of the arch of the pubis, through which Celsus and M. Lisfranc have recommended that the bladder should be opened, for the purpose of extracting the stone in females, and which performs no special function relative to generation.

§ VI. OF THE URETHRA.

140. Beneath the vestibule is perceived the orifice of the *urethra*; this opening is separated from the vagina only by a kind of tubercle, which projects more or less in different persons, and which terminates its anterior middle column. On account of this tubercle, nothing is so easy as to sound a woman's bladder without uncovering her, for after a very little practice, the finger suffices for distinguishing it and guiding the sound. In women the urethra† is large, conical, about twelve or fifteen lines long, scarcely curved; it has neither prostate gland nor bulb; its lower wall may be said to be confounded with the anterior wall of the vagina, and would be rubbed, contused, and lacerated much more frequently than it is, were it not that it is situated at the very top of the pubic arch, in a free space, which is so narrow that neither the occiput nor forehead of the child can reach it to lodge in it. Its natural direction, shortness, extensibility, and width, readily explain the ease with which the catheter is introduced, the rare occurrence of urinary calculi in women, and the fact that even fecundation has

* Several females have been cured of *nymphomania* and *masturbation* by extirpating the clitoris, after every other remedy had failed, proving its erotic sensibility.

The clitoris is very large in some animals, especially in the *Monkey*, which is known to be very lascivious.—H.

† The urethral canal is sometimes the seat of polypus. Moreau extirpated one the size of a large strawberry, which adhered by a narrow pedicle.—H.

sometimes taken place where the womb opened only into the bladder.

141. The *orifice of the vagina*, irregular, and of greater or less size in women who have borne children, more rounded, but of equally variable dimensions in married women who have never yet become mothers, is in virgins contracted by the *hymen*.

§ VII. OF THE HYMEN (*valvula vaginalis*).

142. Admitted by some and rejected by others during the seventeenth and eighteenth centuries, the hymen, and not the *membrane of the hymen*, as it is denominated in several French works, is a fold which always exists, provided it have not been destroyed, in young girls. In shape resembling a half moon with its concave and sharp edge turned forwards, its extremities are sometimes so much prolonged as to unite under the urethra, and thus form a circular valve, whose breadth, however, diminishes as it approaches the meatus urinarius: being on its convex edge continuous with the mucous membrane of the vagina and vulva, the hymen may contract the entrance of the vulvo-uterine canal in very various degrees, and even close it entirely. Its circle always contracts from behind forwards. I have sometimes detected muscular fibres in it, which were arranged in a decussating manner as in the womb; in such cases, it was thick, strong, elastic, and very much developed; at other times I have seen it thin, transparent as a pellicle, and very easily broken; in general it is thicker at birth than at any other period of life. In new-born infants it often presents the shape, the rosy tint, and softness of the lesser labia.

143. Regarded as the seal of virginity by the vulgar, and for a long time so considered by medico-jurists and magistrates, the hymen has on more than one occasion been the cause of an iniquitous decision by the tribunals, either in condemning an innocent woman, or, on the contrary, in absolving one who was scandalously guilty. But at present it is universally admitted that a thousand causes foreign to the act of coition may destroy it, and that copulation itself does not always occasion its rupture. If this membrane be thin, delicate and broad, a sudden or extensive movement of the limbs, excoriations, the appearance of the menses, &c., may cause it to disappear. If it be thick, muscular, elastic, but narrow, the sexual union would not be prevented, and the hymen might remain whole until labour should take place, as is proved by the cases mentioned by Paré, Nægèle and others; but I believe it incapable in any case of furnishing a real obstacle to the escape of a child.*

* I consider the hymen to be a fold or duplicature of the mucous lining of the *orificium vaginae*. It is in all respects analogous to the *valvulae conniventes* of the bowel. In many individuals it is ruptured by the sexual congress; in others it escapes uninjured, and is not *unfrequently* met with in the examinations made during the conduct of labours. Like the other tissues with which

If the hymen be broad and resisting, while at the same time it either partially or completely closes the canal of the vagina, it might form an insurmountable obstacle to the flow of the menses outwards, and by retaining the blood in the vagina or womb, give rise to symptoms that would be more or less important, according to circumstances. Smellie, Denman, &c., report the cases of women in whom this state of things produced all the general symptoms of pregnancy, and who recovered their ordinary health as soon as an incision into the hymen had allowed of the escape of the blood with which the parts were filled. I have been consulted on account of one young lady twenty-two years of age, whose hymen had prevented the consummation of marriage. I met with another specimen, in the corpse of a woman about forty years of age, who had cohabited with her husband for a long time, but without having any children. As a general rule, however, the hymen is ruptured* at the first sexual approach, which, in consequence of this laceration is accompanied with more or less pain, and a slight discharge of blood. When once torn, its shreds contract, and give rise to one or more tubercles, known by the name of myrtiform caruncles.

§ VIII. OF THE MYRTIFORM OR VAGINAL CARUNCLES.

144. There are still a great many physiologists who think that the myrtiform caruncles are special organs, and independent of the hymen; they found their opinion on the circumstance that they are sometimes found even where the hymen is whole, and that their number and situation do not appear to be accounted for on any other hypothesis. The opposite opinion tends, it is true, to predominate; but as its supporters have not refuted their antagonists so convincingly as to dissipate all doubts on the subject, I have sought for the cause of such a discrepancy of sentiment, and believe I have discovered it. Of the four caruncles commonly observed at the entrance of the vulvo-uterine canal, and which correspond to the four extremities of the vertical and transverse diameters of this opening, two, namely, that which is near the meatus urinarius, and that which is near the fourchette, belong to the middle columns of the vagina, while the other two only are the remains of the hymen. The former, therefore, exist even in vir-

it is connected, it is tractile and distensible to such a degree, that it is even possible for a child to be born without destroying it, as I have ascertained in my attendance on persons confined with a second parturition. I make this statement with confidence, as I am sure it will be confirmed by persons much engaged in obstetric practice, who will take the trouble to make the inquiry.—M.

* The introduction of a pessary generally destroys the hymen in virgins.—H.

gins, while the latter ought only to be met with after coition. It is clear, moreover, that these latter, or the lateral caruncles, may vary in number, size and situation, accordingly as the hymen is broken into two, three, or four shreds, of equal or unequal sizes, in this or that direction, and according as the hymen itself was of greater or less thickness and breadth; these latter caruncles are altered in form, and sometimes disappear entirely in consequence of labour, while, on the other hand, the median caruncles enlarge,* rather than diminish with the progress of age.

§ IX. PERINEUM, FOSSA NAVICULARIS, FOURCHETTE, FRÆNUM, COMMISSURE.

145. Between the perineal commissure of the vulva, or greater labia, and the convex edge of the hymen, or posterior semi-circumference of the outer orifice of the vagina, is seen the *fossa navicularis*; the fourchette or the frænum forms its anterior edge, and ought not to be confounded with its posterior edge, which is the commissure itself. It most commonly happens that the fourchette is torn in a first labour, and the fossa navicularis is thereby forever destroyed.

146. The perineum,† which separates the vulva from the anus, is scarcely an inch, or an inch and a half in length; its inferior surface is composed of skin; it happens but rarely that it is covered with hairs, which, if they be cut off, produce, while growing again, the effect of a brush, and sometimes occasion intolerable pain, the cause of which it is well to understand. Above, that is, between the skin and the point where the rectum and vagina come into immediate contact, there is a triangular space filled with fleshy fibres, cellular tissue, fat, nerves and vessels, and which, constituting a part of the perineum, allow it to elongate itself very considerably during labour; to such a degree, indeed, as will be seen in the sequel, that from being only an inch long, as in its natural state, it may be extended even to four or five inches in length, when most strongly pressed upon by the head.

147. Without repeating on this occasion what I have elsewhere said, of the arrangement of the parts that compose the female perineum, I think it may be, nevertheless, useful to recall to mind the mean dimensions, which, after a great number of observations, I

* These caruncles are sometimes hypertrophied, and require excision. Moreau removed one from the posterior part of the vaginal canal which was two inches long by a single cut of a pair of scissors.—H.

† Under the term perineum, the accoucheur includes all the space between the posterior commissure of the vulva, and the point of the coccyx, and between the two tuberosities of the ossa ischia.—H.

have been enabled to establish in relation to the various objects which I have now examined.

It is found:

1. That from the upper part of the pubis to the clitoris is two inches and a half.
2. From the anterior commissure of the vulva to the anus, three inches and a half.
3. From the clitoris to the posterior commissure of the vulva, one inch and a half.
4. From the posterior commissure of the vulva to the point of the coccyx, three inches.
5. From the coccyx to the anus, about eighteen lines.
6. From the anus to the vulva, fifteen lines, allowing only a few lines besides the orifice of the rectum.

It is also useful to know that the constrictor vaginæ muscle,* which is analogous to the accelerator urinæ of the male, is enclosed within the body of the greater labia, and that it is so strong in some individuals, as to contract with energy during coition, and considerably lessen the size of the orifice of the vagina; that the only important artery in the neighbourhood of these parts, the pudic artery, is confined as it were entirely towards the circumference of the perineal strait, and consequently, that it is not on account of hemorrhage that lacerations of this region are likely to prove dangerous.

§ X. DIFFERENCE BETWEEN THE EXTERNAL ORGANS OF GENERATION OF WOMEN, AND THOSE OF BRUTES.

148. In reviewing the principal zoological classes, it is easy to perceive that the external sexual parts, mere organs of coition, as in the human species, are far from exhibiting the same characters, and the same completeness in all cases.

In fishes, reptiles and birds, the cloaca supplies their place, except in some species that have a clitoris; in the mammiferæ, the horizontal posture renders a mons Veneris useless, and accordingly not a trace of it is to be found.

According to M. Cuvier, neither do the nymphæ exist in any family; however I have reason to think I observed it in the giraffe which is now in the Jardin du Roi.

149. The vulva and greater labia are met with in all classes, but with very various forms. The interior is almost always wrinkled, as in the cow, the tiger, &c. Placed lengthwise in the majority of animals, it is in some cases transverse as in the hyena,

* Dr. Physick had a female patient that could cause the sphincter vaginæ muscle to contract with such energy as to close the vaginal canal and thereby retain an injection.—H.

or circular as in the rabbit, and in most of the rodentia; very shallow as in women; it forms in the guinea pig a canal as long as, or even longer than the vagina of the bear and some species of the monkey; all of them have a clitoris, which in some is very small, and very large in others, the monkey, for example, where it is connected as to size with an excessively lascivious disposition. The hymen, attributed by most authors to woman alone, is certainly to be found in a great number of animals. Is the plait or circle that separates the vagina from the vulva in the she-goat, the ewe, and the bitch any thing else? M. Cuvier has noticed it in the hyena and the daman. It is impossible to mistake it in the semilunar membrane which contracts the vagina of the virgin mare and she-ass, or in that which was noticed by Steller, in the lamantin of the north: I think the giraffe has it also. The greater labia, the clitoris, and the hymen are therefore the most constantly met with of all the external organs of generation; and in all the species, these parts of coition are, therefore, rather destined to augment the pleasure of the venereal congress than to play any fundamental part in the great act of reproduction.

§ XI. ANOMALY OF THE EXTERNAL ORGANS OF GENERATION.

150. I have already spoken of the preternatural development of the clitoris and nymphæ, as well as the extreme length of these parts among certain nations; I have now to remark, that the greater labia have been in some instances found wholly wanting, in consequence of malformation of the individual; sometimes they adhere to each other, either at one spot or throughout their whole extent, as in the three examples cited by Madame Boivin, as was seen by Cassan and M. Williaume, who saw one case each, and as is frequently met with in Persia, Egypt, Turkey, and throughout almost the whole of Africa, where the barbarous custom of infibulation is still practised. Borelli says he saw, in the hospital of Castro, a little girl who had two vulvas, one above the other. It might also be said that where the vagina is completely double, there are two lateral vulvas. The same anomalies are found to occur in the nymphæ, which Neubauer in one case found to be triple, and which depend, too, more frequently on an acquired disease than on a primitive fault of the conformation.

SECTION 2.

Internal Genital Organs.

The internal parts of generation in women consist of the womb, the vagina, the Fallopian tubes, the ovaries, and the ligamentous attachments.

§ I. OF THE UTERUS (*matrix*).

151. The *uterus* or womb is a hollow muscle, destined to lodge and nourish the ovum during pregnancy, and expel it by the process of labour. It is therefore essentially the organ of gestation, and not of generation, as has been erroneously repeated by several authors.

152. *Situation.* Situated in the pelvic excavation, behind the bladder, in front of the rectum, beneath the small intestines, and continuous below with the vagina, the uterus, in its unimpregnated state, is generally placed in the direction of the axis of the superior strait.

153. *Configuration.* Its shape is that of a pear or a small flattened gourd, or further, of a truncated cone, compressed antero-posteriorly, its base being turned upwards, its apex downwards.

154. *Division.* For the purpose of explaining the phenomena of pregnancy, the womb is divided into fundus, body, and neck. The *fundus* comprises all that portion that is found above a horizontal line drawn from one Fallopian tube to the other; the body extends from this same line to the contracted portion which marks the commencement of the neck; and the latter, more or less swelled, constitutes the lower portion of the organ.

A. *External Surface.*

155. The external surface of the womb has been divided into, 1. An *anterior region*, which is slightly convex, its upper half being covered with peritoneum, and the remainder being in contact with the basfond of the bladder; 2. A *posterior region*, much more convex than the preceding, covered in its whole extent with peritoneum, and separated from the rectum by a space or chink in which the intestines may become strangulated; 3. Three *edges*, one of which, *superior*, convex, and smooth, corresponds to the fundus, and two others, *lateral*, convex on their superior half, and concave below, are lost, as it were, in the broad ligaments; 4. Three *angles*, the two first, *superior* and *lateral*, unite the three edges, and seem to give origin to the tubes, the ligaments of the ovaries, and the round ligaments; the third, *inferior*, far more important than the others, is seen in the upper part of the vagina, and deserves very special attention.

It exhibits an orifice resembling a transverse slit, dividing it into two lips, and has received the name of the *tench's mouth* (*os tincæ*). Of these two lips, the *anterior*, which is thicker and broader than the *posterior*, is also, indeed, somewhat the longest. Nevertheless, as the vagina ascends higher behind than in front, it seems when a woman is carefully *touched*, that the posterior is longer than the anterior lip. To this peculiarity, doubtless, ought to be attributed the error into which many accoucheurs have fallen, who, not con-

tent with asserting that the anterior lip is the shortest, have also represented it as being the thinnest in drawings which in other respects were most carefully made. To convince any one of the proportional length of the two lips of the neck, it is only necessary to separate the womb from the vagina in the dead subject. It will then be seen that the posterior lip is at the same time the thinnest, the narrowest and the shortest. However, this difference is not to be seen, except in women who have borne children. In virgins the lips are very near to each other, and we can scarcely feel with the finger the line-like slit that separates them; but it may be distinguished, as has been judiciously remarked by M. Dubois, by comparing the sensation produced by touching it, to that experienced by touching the point of the nose with the end of a finger. Sometimes, however, instead of such a narrow slit, we meet with a circular orifice; a modern author has even taken occasion from this circumstance, to advance the opinion, that such is the natural arrangement of the part: but this is evidently an error. M. Désormeaux thinks that this last-mentioned form is particularly to be met with in women who are not apt for fecundation; but this is an opinion which requires to be supported by additional evidence. Besides, we must take care not to confound this circular form with that which is pretty often observed at a certain stage of pregnancy, in women who have borne children before; which it is not always an easy matter, however, to avoid.

156. Before women become mothers, the lips of the os tinæ are smooth, regular and pretty firm, although supple; the whole neck terminates in an extremity which is rather *acuminated* than bulging. After one or two confinements, its slit is wider, more uneven; the free extremities of the lips are farther apart; the anterior is elongated, often ends in a point, and exhibits tubercles or bumps, which are also found on the posterior lip, and separated from each other by crevices of greater or less depth, and in greater or less number, chiefly in the left. It is true, however, that this last-mentioned disposition does not demonstrate with mathematical certainty that there have been several pregnancies, for it may be occasioned by disease. It should also be understood, that the contrary state persists in some women, after a great many lyings-in. Thus, in a woman in her seventh pregnancy, I have seen the vaginal angle of the womb more regular than in another whom I examined by way of comparison, and who was in her first pregnancy: but in this, as in every thing else, we should remember the rule without forgetting the exceptions.

B. Internal Surface.

157. The womb presents an internal surface, which is also called its cavity, and which the accoucheurs divide into supe-

rior portion or cavity of the body, and inferior portion or cavity of the neck.

158. *Cavity of the body.* The first, of a triangular shape, with sides separated from each other only by a layer of mucus which is more or less thick, sometimes exhibits, on the median line, a sort of raphe or crest, which runs through its whole length, and is joined by other oblique or transverse lines. The sides of this cavity, as well as its bottom, are almost straight, sometimes slightly convex in young girls, while they generally remain pretty concave after a lying-in. Its two superior angles are continuous with the origin of the Fallopian tubes, which are sometimes expanded like a funnel, and ought, according to M. Geoffroi St. Hilaire, to be regarded as the rudiment of the *aduterum*, which is remarked in most of the mammiferæ; its inferior angle is called the superior, uterine or internal orifice of the neck, and is the point by which the two cavities of the womb communicate with each other.

159. *Cavity of the neck.* The cavity of the neck, of an oval shape, is twelve or fifteen lines in length, and five or six lines in width at its widest part, and one or two lines from front to rear. On its two walls, and particularly on the posterior one, are found certain plaits or lines, which have been carefully studied of late by Madame Boivin. This is a sort of gathering, which seems to be only a continuation of that which is found in the womb itself, but much more developed. The median crest, the largest of all, more salient in the middle than at either end, is formed, as it were, by the approximation of many small secondary folds crowded together. The transverse lines are all oblique from above downwards, and from the sides, inwards, towards the preceding line, on which they terminate, like the barbs of a feather, on their stem. Slightly concave upwards they leave pretty deep grooves between each other, in which a good many mucous follicles are to be found, and occasionally, some small round transparent vesicles, a sort of hydatids, formerly regarded as germs, and for a long time known as the eggs of Naboth. More deeply seated, that is, beneath this net-work, which constitutes what is called the *arbor vitæ*, there is another one, somewhat differently disposed, but which cannot be examined until we come to speak of the structure of the organ. At the place where the two walls of the neck unite, and where the transverse lines, too, are confounded, are also seen two longitudinal lines.

160. The superior opening of the neck having been above indicated as the *uterine* orifice, it is useless to return again to the consideration of it. The inferior orifice divides the lips of the os tinæ from each other; and as it opens into the vagina, it may very properly be called the vaginal orifice of the womb. From what has been said, and which ought to be understood of the *cervix* of a young woman, previously to being fecundated, it is evident

that the inferior angle of the uterus ought to be quite acute, that a little higher up the size of the neck should be greater, and that this part ought to be again contracted, and, as it were, strangulated at the place where it unites with the body of the organ.

C. *Dimensions of the Womb.*

161. In women who have never had children, the womb, measured from the most salient point of the fundus to the end of the anterior lip of the neck, I have found to be of an average length of from twenty-six to twenty-eight lines; from one Fallopian tube to the other, from seventeen to twenty lines; from front to rear, in the thickest part, nine to eleven lines; at the neck I have found that there were, transversely, ten to twelve lines, five or six lines from front to rear, eight or ten lines across at the place where it is strangulated, and that there were four lines of thickness at the same point. The parietes of the womb are four lines in thickness at the body, and two or three at the neck; the lips project two or three lines into the vagina, and the slit that separates them is of about the same extent.

162. After several pregnancies the uterus is from two and a half to three inches in its entire length; twenty to twenty-four lines wide at the fundus, fifteen to sixteen at the widest part of the cervix, twelve to fourteen lines thick at the body, eight to ten at the neck, and each of the walls is six lines in thickness: the vaginal orifice is half as large again as in a virgin.

In the first named state, the womb weighs from eight to twelve drachms, and in the second about two ounces. It will be seen that these dimensions are very near those given by Ræderer; and they are the results of a considerable number of measurements taken on the dead subject.

D. *Structure.*

163. An external membrane, an internal membrane, a peculiar tissue, numerous vessels, nerves and cellular tissue enter into the composition of the womb.

164. *a.* The *external membrane*, of a serous character, belongs to the peritoneum; posteriorly, it descends lower than the cervix, on to the posterior surface of the vagina, while, in front, it is reflected upon the bladder after having invested the anterior surface of the body of the uterus, and before it reaches the cervix. Very closely adherent along the upper edge and median line of the uterus, it becomes less so nearer the sides, and in the neighbourhood of the broad ligaments may be easily detached. Observers have not agreed in relation to its thickness, doubtless because it has often been confounded with the layer immediately beneath it, but

which in reality ought to be distinguished from it. On the whole, it is thin and very dense.

165. *Sub-peritoneal layer.* This is a kind of doubling which gives to the peritoneal layer a borrowed thickness, covers every part of the uterus, extends itself into the broad ligaments, and is, indeed, only a portion of the common sub-peritoneal fascia, which at this point assumes most of the characters of the yellow fibrous tissue; that is to say, it is elastic, strong, dense, and may be converted into real muscular tissue, as has been remarked by Madame Boivin, and as I have several times observed myself.

166. *b.* The existence of the *internal membrane* is not admitted by all anatomists. Gordon, Chaussier, M. Ribes, &c., reject it; the most careful dissections, putrefaction, ebullition, chemical reagents, have all failed in demonstrating its existence to these observers, except towards the close of pregnancy; but at that period it constitutes, according to them, a pellicle of new formation, and not a natural membrane. Bécclard also taught that the internal membrane of the uterus is not a complete mucous membrane, and that it has no epithelium. It is true, that except during pregnancy, we cannot always demonstrate the existence of an uterine mucous membrane, but in several women who died while pregnant, or shortly after delivery, I have succeeded in raising very distinct portions of it. But even could we not succeed in separating it mechanically, analogy would suffice to convince us of its presence; the mucous membranes are exclusively provided with villi; they alone furnish mucus in the healthy state, and muco-purulent matters in a state of disease; it is on their surface that we meet with polypi and sanguine exhalations. Hence, the glairy discharge that occurs during labour, the leucorrhœal discharges, the menstrual function, &c., all prove that the inner surface of the womb performs the same functions, and is subject to the same diseases as the mucous membranes. I conclude, therefore, that if we can in reality refuse to admit the existence of a membrane, we shall at least be forced to admit that the uterus possesses a mucous surface. During several weeks, no organ of the fœtus is, properly speaking, invested with a mucous membrane; not one of them can be divided into lamellæ of different natures; they are all formed of a homogeneous tissue; the intestines, like the other hollow organs, are possessed not of internal and external membranes, but of surfaces; it is only at a later period, little by little, and in the same situations where they are observed after birth, that the distinction of tissues, established by the zoologists, is effected. Thus, the interior of all the cavities, of all the canals that communicate nearly or remotely with the atmosphere, exhibits the aspect of villous surfaces; but to this fundamental character are added others which differ according to the organ, and reduce every portion into harmony with the uses of the parts it helps to constitute. Sometimes

it is a movable lamina, thick and wrinkled, as in the alimentary canal; in other instances, it is a thin smooth layer, difficult to separate from the subjacent tissues, as in the ureters, the vasa deferentia, &c. Although follicular and villous, this element may adhere so intimately to the substance of the organs, that it is impossible to separate it; and this is the case with the womb. Nature, true to her great principle, seems here to take pleasure in varying forms without multiplying means; on some points she is content with a mere rudiment, while at other points she at once attains perfection; but on the other hand, that which, so to speak, she leaves incomplete in the normal state, is rendered complete by disease, or by some eventual condition; in this way it happens that a pregnancy, a polypus, or some other lesion, has, in more than one instance, rendered the mucous membrane of the uterus altogether evident.

167. *c. Peculiar tissue, or parenchyma.* Situated between the two preceding layers, and alone constituting almost the entire essential and fundamental part of the organ, the proper tissue of the womb has been the subject of the researches of a great many very able anatomists. Bonacciolus, Swammerdam, Meckel and Ruysch, Noorthwyck, Sue, Hunter, Loder, Weisse, M. Lobstein, Belloni, and very recently Madame Boivin, have striven to demonstrate its texture, before, during, and after pregnancy; but in spite of so many exertions, opinions are still far from being unanimous in regard to its nature.

168. *Nature of the peculiar tissue of the womb.* The same thing has taken place in regard to the womb, as always occurs in anatomy, whenever the analogies and comparisons, which authors are obliged to draw for the purpose of illustrating their ideas, are rigorously construed according to the letter. When Vesalius asserted that the womb is a muscle, Walter, taking the muscles of the skeleton, and even the heart or the intestines as his type, found no difficulty in proving that Vesalius had made a mistake. Although, on the one hand, Malpighi, Ruysch, Noorthwyck, Wrisberg, Meckel, Lobstein, and the major part of modern anatomists, have arranged themselves on the side of Vesalius, we see on the other, Boehmer, Blumenbach, &c., alleging reasons that are apparently very plausible, to prove that it is at least not founded on the state of the organ when unimpregnated. Both sides have often been right; but, by referring to forced approximations, they have too often lost sight of the object to render it possible to reconcile so many various observations.

Previously to asserting that the womb does or does not contain muscular tissue, it would have been proper to determine what are the characters of that tissue in general; to show that the red colour is not essential to it, since it is wanting in the muscles of fishes, reptiles, and even in the muscular coat of the human intestines;

and that the same is true of the fibrous appearance, since it is met with in the tendons, aponeuroses, &c., but that it alone enjoys the faculty of contractility, and contains fibrin.

In the second place it should be considered indispensable to recognise a truth that is too much overlooked in our days: which is, that the fleshy fibre must necessarily pass through several less perfect gradations of development; that, in some organs it remains in the rudimental condition, and is developed only by accident. Thus, the trachea and the bronchia, even the arteries of large animals, the elephant among others, evidently exhibit muscular fibres, while the same organs in the human species rarely exhibit them with any distinctness. The gall bladder, the vesiculæ seminales, &c., are not furnished with them, according to most of the modern anatomists; but let these organs be examined when their coats, strongly hypertrophied, have been long distended, and we shall be soon forced to admit that they possess a muscular coat, as the ancients believed, and as I have seen myself. The womb, previous to puberty, is only a rudimental muscle; when not gravid, its organization, it is true, is but a sketch, but it is only towards the end of pregnancy that we can possibly test its nature. Every circumstance tends to establish that the cellulo-fibrous, elastic yellow tissue which composes the basis of the inter-laminar and inter-spinal ligaments of the vertebræ, constitutes also the web of a very great variety of other organs. It is nowhere more abundant than in the uterus. Hence it appears that this element holds a middle place, and serves in some sort as a passage between the cellular and muscular systems; the chemists have detected fibrin in it, and I have seen it on various points transformed into real contractile tissue. I am scarcely afraid to assert that wherever it is met with, it may accidentally develop muscular fibres, and that these fibres exist naturally in some zoological species.

169. In order, therefore, to understand the essence of the uterine tissue, it ought to be studied during its gravid state: then only is it red, contractile, formed of tomentose fibres; then only does it contain a great proportion of the fibrin, and presents, in a word, all the characters of the most perfect muscular tissue.

170. *Disposition of the fibres.* Vesalius, Malpighi, and the first anatomists who admitted their existence, contented themselves with saying that the fibres of the womb are so interlaced, that it is impossible to trace out their direction. Ruysch and some others advanced, that being principally collected about the fundus of the organ, they compose an orbicular muscle, a sort of disc, the use of which is to detach the placenta at the period of labour. Hunter, Sue, &c., admit that it forms a number of layers variously crossed; A. Leroy teaches that they give rise to two layers of muscles, one internal and one external; and M. Meckel, who, in common with several German anatomists, partially adopts this sentiment, thinks

that each of the two principal layers ought to be divided into several other secondary layers. Baudelocque, and most of the French anatomists, abandoning all hopes of assigning to these fibres a determinate direction, have contented themselves with teaching that they are disposed in loops, parallel to the axis of the uterus, or in horizontal circles; that the body and fundus of the womb are chiefly composed of the former, while the latter are found more especially in the neck. Indeed it will be hereafter seen that great stress has latterly been laid on this idea, which is relied on for the explanation of the process by which the cervix is effaced during pregnancy, and dilated in labour, &c., and also the occasional causes of parturition. Lastly, Madame Boivin, to whom we are indebted for some valuable researches on this subject, has observed a much greater number of fleshy layers in the womb than any preceding author. She admits, 1. A longitudinal fascicle; which occupies the median line in front and rear; and extends from the fundus to the neck; 2. On each surface of the organ, and on both sides of the vertical column, three layers of transverse fibres, which proceed to lose themselves, outwards, in the tubes, the ligaments of the ovaries, the round ligaments and the posterior ligaments; 3. At the superior angles of the uterus, and deeply seated, a circular layer, the centre of which corresponds to the origin of the tubes, and which interlaces and confounds itself with the opposite one; 4. And lastly, very near the mucous surface, a layer that is thinner than any of the others.

I have myself dissected a very great number of wombs, at every period of age, both unimpregnated and during the gravid state, and I am convinced that each of these modes of regarding the subject has some foundation. The imbrication noticed by Malpighi and his predecessors is not to be disputed, and does not exclude the existence of the muscle spoken of by Ruysch. This last author, although opposed by Heister, Haller, &c., was almost entirely right: it suffices merely to examine the inner surface of the womb, at the close of pregnancy, to recognise the stratum of muscular fibres he mentions; only instead of one orbicular disc admitted by the celebrated Dutch anatomist, there are two. The two layers spoken of by A. Leroy, Rosenberger, M. Meckel, &c., are completely apparent in the last month of gestation; but it must not be expected that they can be found independent of each other. Considered in a general manner, all these peculiarities agree together very well, and further, they agree with the sentiment of those who insist upon it that the womb contains none but fibres arranged in loops or vertically, and in circles or horizontally.

171. *Conclusions.* Upon the whole, the following are what I have most invariably observed on this subject. 1. Beneath the peritoneum there is a first stratum that is thin, dense, elastic, cellulo-fibrous, and sometimes but not always muscular, in which

the fibres have no determinate direction ; 2. A thicker layer of transverse fibres, which, united in different planes, and imbricated like the constrictor muscles of the pharynx, all tend outwards, and converge towards the four principal points mentioned by Madame Boivin ; 3. More deeply seated are found other transverse fibres ; but the longitudinal and oblique fibres predominate, especially at the neck where they constitute the basis of the ridges observed on the inner surface of the organ ; lastly, above is seen the pretended *detrusor placentæ* of Ruysch, which seems to be nothing more than an expansion of the circular fibres of the Fallopian tubes.

The basis of all these strata is the yellow cellulo-fibrous tissue, surcharged with fibrin ; the fleshy tissue develops itself in this primitive web as in the intestines ; but inasmuch as the womb seems to be composed by the union of two cylindrical canals, and as it is necessary that it should be endowed with great strength, it is not astonishing that its multiplied fibres should affect the most complex and varied directions.

172. *d. Blood-vessels.* Two orders of arteries are appropriated to the gestative organs: one, known as the *uterine arteries*, furnished by the hypogastrics, penetrates into the substance of the womb at the cervix ; the others, the ovarian, given off by the aorta or the emulgents, pass along in the broad ligaments, and after being partly distributed in the ovaries, proceed to the sides of the body of the womb itself. In ramifying, those of the left side inosculate with those of the right, those from above with those from below, and as all of them are strongly compressed in the substance of the tissue in which they creep, they are doubled and redoubled a great many times. The veins, distributed in the same manner as the arteries, go to the internal iliac vein from one part, and to the ovarian veins from the other. During pregnancy, these various canals, partially unfolded and largely dilated, run chiefly between the two fleshy strata so much insisted upon by A. Leroy.

173. *e. Its lymphatic vessels* pass into the pelvic and iliac ganglions ; its nerves came from the sacral plexus, and from the ganglionic system by the renal and hypogastric plexuses. The former are distributed almost exclusively upon the cervix, and it is natural to attribute to them the excessive sensibility enjoyed by this part ; while the latter, being here destined to furnish only the vegetative sensibility, must be more regularly distributed to all parts of the womb.

§ II. FALLOPIAN TUBES (*tubæ Fallopiæ*).

174. The *uterine tubes*, or Fallopian tubes, (*seminiferous ducts*), are two small, hollow cylinders, four or five inches long, as large as the barrel of a quill, and extending from the lateral angles of the womb, with which they are continuous, to near the iliac fossæ, where they terminate in a lacinated and loose extremity, called the

devil's-bit (*morsus diaboli*) or *fimbriated extremity* of the tube.— This tortuous tube is enclosed in the upper edge of the broad ligament; its cavity, which, at the womb, is large enough to admit of a middle-sized probe, at first contracts by degrees, so that near its middle a bristle can scarcely be passed through it; it then enlarges, and soon acquires a diameter of two or three lines. Among the fringes which terminate its loose extremity is one that is harder and longer than the rest, which fixes itself to the ovary, and seems to be the real continuation of the tube.

175. *Structure.* The composition of the seminiferous tubes is in all respects similar to that of the uterus itself. They are enveloped externally by the peritoneum, which adheres closely to them, and a mucous membrane, folded in the direction of their length, lines them within. A pretty thin layer of fleshy fibre is found betwixt these two laminae; its fibres are of two sorts, like as in the small intestines: one sort, longitudinal, are only a prolongation of the transverse stratum of the surface and fundus of the uterus; the others which are circular, cut the former at right angles, and seem to be appendages of the orbicular muscle of Ruysch. As to the internal coat, its existence has been denied; but to the proofs related above (166), I may add, that in a woman of middle age, I and M. Baudelocque, jun., saw the mucous membrane of the Fallopian tube as movable, and as easily separable, as it is in the œsophagus; its valvular folds, mentioned by those authors who assert that the ovule may easily pass to the womb, but cannot possibly retrograde towards the ovary, and especially, that the *semen masculinum* cannot pass through the tube, have been the products only of the imagination of those who needed them for the defence of their preconceived theories. The tubes receive all their vessels from the ovarian branches; their nerves belong to the great sympathetic, and, like the uterus, their basis is an elastic, fibrous, cellular tissue.

§ III. OVARIES (*ovaria*).

176. The ovaries, long known as the *testes muliebres*, and which may be called the female *seminal glands*, are situated in the upper part of the broad ligaments, behind, and a little below the tubes, near the superior angles of the uterus, to which they are attached by the *ligament of the ovary*. Oblong, slightly flattened from front to rear, being of the size and almost of the shape of an almond or a large bean, the ovaries have a superior, convex and loose edge, while their inferior edge is straight, receives vessels, and proceeds to join the ovarian fringe of the tube. Their surface even, or scarcely botryoidal in women who have never been fecundated, presents, on the contrary, in those who have had children, inequalities, fissures and reliefs in a greater or less degree. Differing as much both in appearance and nature from the salivary glands to which

Pean compared them, as they do from the seminal glands of the male, the ovaries possess a structure which is peculiar to themselves, as is the case in all the special organs. A sort of parenchyma of a reddish-gray colour, composed of lamellæ and filaments variously interlaced, constitute their principal tissue. Since the time of R. De Graaf, it is admitted that there really do exist in this parenchyma certain transparent vesicles, from twelve to twenty in number, and which are denominated ovules or germs. In it also we occasionally meet with accidental vesicles, true hydatids, which should not be confounded with the former, but which may possibly be only degenerated ovules. According to De Graaf, "vessels and preparative nerves enter into these vesicles, on the tunics of which several of their branches, after various divarications, distribute themselves, as occurs in the yolk of the egg while it is still attached to its ovary." A strong, thick, and very tough membrane serves as the shell or envelop of this tissue; and according to my observations, this fibrous membrane is only an appendage of the ligament of the ovary; that is to say, the ligament of the ovary, which is one or two inches in length, and one or two lines thick, is formed by a fascicle, from the transverse layer of the posterior surface of the uterus, and when it reaches the point of the seminal gland, its fibres separate in order to envelop the parenchyma in question. It is evident that the *proper* tunic of the ovary is altogether distinct from the peritoneal layer, from which, however, it is impossible to separate it. In naming it *dartos*, it is probable that the ancients did not suppose that, like the *dartos* of the male, it approaches by its nature very nearly to the contractile or muscular tissue.

177. Until the time of Fallopius, it was generally taught that the germ was carried from the ovary to the uterus by different canals, of which the tube did not constitute any part; the ligament of the ovary was supposed to be the principal one; it formed the deferent canal. Warthou and Mauriceau admitted one or two others, which passed from the edge of the ovarium and opened into the vagina; but it was long ago demonstrated that the ligamentous cord of the ovary is solid, and contains no canal; however, the other passage, also forgotten for a whole age, has just been recalled to the attention of naturalists by M. Gartner, of Copenhagen, who looks upon it as an organ that is always to be met with in the large quadrupeds. I have vainly sought for it in the human subject, and found nothing even remotely resembling it. The ovary* is the essential organ of generation, the organ in which germs are formed.

* It is now pretty clearly ascertained that the ovaries are the *efficient cause* of menstruation, and that one or more *Graafian vesicles* are ruptured at each menstrual period. This is often followed by a

§ IV. LIGAMENTS OF THE UTERUS.

178. In investing the internal organs of generation, the peritoneum gives birth to several ligamentous folds, which it is proper now to describe.

Of these, the chief are the broad ligaments, which constitute a transverse partition, and divide the whole depth of the pelvis into two cavities, one anterior and the other posterior; in the former the bladder is situated, and in the latter, which is deepest, is found the rectum; the two laminae of the peritoneum, of which the broad ligaments are composed, separate when they reach the sides of the womb, in order to spread out on its surfaces; downwards and outwards, they also deploy so as to be continuous with the peritoneum which lines the cavity of the pelvis; their superior border, which is loose, extending from the angles of the uterus to the iliac fossa, is divided, as it were, into two or three secondary folds, which are called its lesser wings; one of these, the posterior, encloses the ovary and its ligaments; another (the middle one, according to M. Dubois and the other authors who admit three of them; but the anterior one, according to Baudelocque, M. Désormeaux, and all the accoucheurs who contend that there are only two), contains the Fallopian tube, and is the highest; the third, mentioned by some and rejected by others, and which is in fact scarcely distinguishable in the natural state, is found in front of, and lower down than either of the preceding ones, and encloses the round ligament. The two serous laminae of the broad ligament are not in immediate contact; they are separated by a layer of cellular tissue, of various thickness in different individuals, and this layer, which downwards and outwards becomes blended with the sub-peritoneal cellular tissue, or the *fascia propria* of the pelvis and iliac fossæ, is sometimes found to contain muscular fibres; so that we find, in the broad ligaments, nearly the same elements as in the womb itself.

179. The *round ligaments* or *sur-pubic cords*, fibrous bundles, which take their rise in front of and a little below the Fallopian tubes, follow the outline of the anterior semi-circumference of the superior strait, and proceed, after passing through the inguinal rings, to terminate in the groins and mons Veneris, are the only ones which have been deemed, with the broad ligaments, worthy of attention. Formed of reddish and wavy fibres, which rise from the anterior and middle transverse layers of the womb, the round ligaments are evidently of a muscular nature. Dionis asserted that the use of the round ligaments was to depress the os tincae by contracting during the sexual embrace, and thus to bring it closer to the male organ; but as their origins are lower than their

corpus luteum, and hence the presence of this *round yellowish body* is no longer a test of previous gestation.—H.

insertions, it is manifest that their contraction in that case would produce a rather contrary effect. But further, the womb without them would be always retroverted by the bladder, which is repeatedly distended with urine in the course of every twenty-four hours: they also uphold it until towards the middle of pregnancy; but further than this, nothing is certainly known in regard to their uses, and there is no occasion for me to enter into an argument against the opinion of the ancients, especially of Spigelius, who supposed that the semen passed through them into its passage to the clitoris. Being put on the stretch by the ascent of the womb, it is possible that they may, when the woman is on foot, and particularly when on her knees, occasion pretty smart pains in the groins and thighs.*

180. Douglass, A. Petit, Sue, &c., have noticed four other ligaments, two *anterior* (*utero-vesical* of Madame Boivin), and two *posterior* (*utero-sacral*, id.); the two former, very small in most women, passing from the sides of the cervix uteri to the lateral parts of the bas-fond of the bladder, are occasionally composed, in addition to their peritoneal coat, of a few fleshy fibres, that seem to be detached from the antero-inferior transverse layer of the neck of the womb. The latter, which are much stronger and more constantly observed, originate a little lower down, from the posterior surface of the cervix, run backwards, each forming a crescent, the concavity of which looks towards the median line, and are attached to the sides of the rectum, where they are lost in the cellular tissue and peritoneum which invest the front of the sacrum: from numerous facts that have come under my notice, I am of the opinion that they are of the same nature as the round ligaments, and that their fleshy fibres are furnished by the postero-inferior transverse layer of the uterus; consequently, it may be conceived that they may tend to prevent the retroversion of the womb, and be in this respect congeners of the round ligaments: that their use is to prevent the os tincæ from being carried forwards; and that the knowledge of them is far from being unimportant to the accoucheur.

§ V. OF THE VAGINA.

181. The *vagina*, or vulvo-uterine canal, an organ for eduction and copulation, is a cylindrical canal, four or five inches long, by about an inch in diameter, which extends from the vulva, where it is continuous with the labia and hymen, up to the neck of the uterus, to whose circumference it is attached. Its direction is

* It is very common for women labouring under prolapsus uteri to complain of pain and soreness in the regions traversed by the cords. I am accustomed to the prescription of leeches for these regions, in many cases of uterine disease—as I consider that blood taken from capillaries here, actually effects depletion of the vessels of the uterine circulation.—M.

nearly parallel to that of the posterior wall of the excavation, that is to say, it is concave in front, and convex posteriorly, is situated in the axis of the inferior strait, and forms an angle of about sixty-five degrees with the great diameter of the womb. From this disposition, it happens that its posterior wall is much longer than the anterior, and its two extremities being inclined towards each other in front, represent pretty correctly the planes of the two straits of the pelvis.

182. *Connections.* The posterior region of its external surface, resting for the middle three-fifths of its whole extent on the fore part of the rectum, assists in forming the recto-vaginal septum; in approaching the vulva its lower fifth leaves the rectum, at a distance equal to the whole thickness of the perineum; its superior fifth, loose in the pelvis, is invested by the peritoneum. Its anterior region is connected by means of a dense and firm cellular tissue, first to the basfond of the bladder, so as to form the vesico-vaginal septum, then to the urethra, which gives rise to the urethro-vaginal septum. The sides of the vagina are surrounded with vessels, nerves, and a very abundant cellular tela.

183. The *interior* of the vagina presents a number of wrinkles or folds, analogous to those which are met with in the cavity of the cervix; the middle column of its parietes, sometimes divided into two, three, or four small parallel columns, increases in thickness as we approach nearer to the vulva; the same is true of the transverse folds; so that the vagina, which is smooth, or almost smooth above, is most commonly rugose and plaited below, like the palate in the ruminating animals. I have already stated (144), that below the meatus urinarius and at the fourchette, these two middle columns constitute the anterior and posterior myrtiform caruncles. Larger in young persons who have never cohabited, and in brunettes with a dry fibre, than in woman who are in an opposite condition, all these wrinkles are effaced during labour, but in general, reappear soon afterwards.

184. The vaginal *cavity* terminates above in a circular groove, or cul-de-sac, much deeper behind than in front. Supple, thin, and situated between organs liable to alternate dilatation and contraction, the sides of the vagina are habitually in almost complete contact; but, as they are endowed with great sensibility, it happens that the capacity of the vulvo-uterine canal varies considerably. Sometimes it is found to be wider at its middle than anywhere else, and that is because the womb is too much depressed; at other times it is only the superior portion, especially in women who have had children, that is found dilated as it were; which depends on the neck of the uterus having remained after delivery lower than it was before marriage. In fine, we shall hardly find it of equal dimensions throughout, except in those who have scarcely ever, as yet, yielded themselves up to venereal enjoyments.

185. *Structure.* Two layers enter into its composition; one, *external*, a real prolongation of the external laminæ of the uterus, has, for its basis, the yellow cellulo-fibrous tissue, and contains a small number of interlaced, very pale muscular fibres, which must not be confounded with the elliptical muscular rings of its vulvar orifice, and which belongs to the constrictor vaginæ muscle. These latter, indeed, act under obedience to the will; the former, on the contrary, are not brought into play except by the gratifications of love. Arteries, and more especially numerous veins, pass through this tissue, and form, particularly below, a real spongy or erectile stratum, which swells under the frictions of coition, and may then contract so much as manifestly to diminish the width of the vagina.

186. The other, *internal*, is continuous with the mucous membrane of the vulva, and is blended, on the lips of the cervix, with that which lines the cavity of the womb; that half which is nearest the pudendum presents all the characters of the most perfect mucous laminæ; in it are found an epithelium, follicles, villi, &c. Near the neck it cannot be separated from the subjacent tissues, and, at that point, nothing demonstrates the existence of follicles and villi. It covers all the duplicatures of the vagina, but does not compose them, whatever may have been said to the contrary by a crowd of authors. The mucous follicles are principally seated at the bottom of these folds, where also the venereal chancre is found to be occasionally concealed.

187. Two small glands, noticed from time immemorial by the anatomists, under the name of *vaginal glands*, or *prostates* of Bartholin, and which have been erroneously classed among the simple follicles, are to be seen under the lateral myrtiform caruncles, betwixt the mucous membrane and the muscular coat; their uses are little understood; M. Gartner, however, thinks they may serve as the point of origin or termination of the canal discovered by him.

§ VI. OF THE SEXUAL ORGANS IN GENERAL.

188. The sexual organs, taken as a whole, and regarded in a philosophical light, may be considered as a dependency of the tegumentary laminæ; that is to say, the mucous membrane constitutes the most important and constantly present portion of them. In the lower animals, as well as in those whose sexual system is in the highest degree complex, the germs are always created at the bottom of a mucous cavity, whether it consists of a simple excavation, or constitutes a canal that is straight, tortuous, &c. However, the generative cavity is sometimes composed of a doubled homogeneous lamina, of equal thickness throughout its whole extent, as in worms, and the species that have no uterus; sometimes, on the contrary, this duplicature is at first very thin in one portion of its extent, becomes in the next place very thick at

another point, and gradually becomes thin again in a third, as is the case in women.

189. Although, in the human species, the generative apparatus forms, as it does in brutes, only along a canal reaching from the ovary to the vulva, it exhibits to us, nevertheless, one of the most perfect of the secretory apparatuses. The ovaries constitute its glandular portion, the uterus is the reservoir, and the vagina the excretory duct; so that they may, in respect to their peculiar functions, be divided into formative, productive, and transmitting organs (*the ovaria and tubes*), into gestative organ (*the womb*), and into educative, conjunctive, or copulative organs (*the vagina and vulva*).

§ VII. VARIETIES IN THE INTERNAL ORGANS OF GENERATION IN ANIMALS.

190. A long tube, extremely thin, double, wound upon itself within the body of the animal, and terminating in a sort of vagina, performs all the generative functions in the lumbricoid worms. Fishes possess enormous ovaries, which contain as many as two hundred thousand ovula, are continued without interruption into the oviducts or tubes, and have a directly external opening. The ovaries of reptiles resemble bunches of grapes, but of various lengths; in birds they present numerous cells, in which the eggs are lodged; the oviduct, always open and trumpet-shaped at its superior extremity, terminates, below, in the cloaca, which supplies the place of a vagina. The mammiferæ alone possess an uterus, but with the exception of that of the monkey, it is very different from the human womb; yet their Fallopian tubes and ovaries differ only by slight shades from those of women. Almost all the rodentia, the ruminantia, the solipedes, the amphibia, &c., possess a womb divided into three cavities; a middle one, which represents the neck, and two lateral ones, called the horns, which must not be confounded with the Fallopian tubes. These horns, or *adutera*, are generally very long, and sometimes are two, three, or four times as long as the cervix, which, in the Guinea pig, the hare, &c., can scarcely be said to exist at all. Hence it may be said, that there are in reality two wombs, two tubes, and two ovaries for one single vagina.

191. Separated in some instances by a very decided contraction from the vulva, and in others continuous, without any line of demarkation, with the vulva sometimes twice or thrice as long as the vulvar canal, as in the bitch, sometimes, on the other hand shorter, as in the bear, the vagina of the mammiferæ exhibits numerous varieties, in respect to its dimensions, the arrangement of its folds, and its connection with the womb.

But the most remarkable genital system is that of the didelphic or marsupial animals: besides the tubes, their womb is composed

of two horns, each of which opens by an orifice furnished with a valvular cushion into a third cavity, largely expanded, of the shape of a cul-de-sac. This cul-de-sac rests upon the vagina, and separates it from its horns, but does not open into its cavity. It sends off a small canal which proceeds downwards and backwards, then mounts upwards in a semicircular manner to the orifice of the vagina where it opens. Further, on the lower part of the belly, they have a very complicated kind of sac, which contains small teats, and where their young are deposited at a very early period; as if for a second gestation.

192. Careful dissections of most of the large animals confirm what I have now advanced, touching the nature of the peculiar tissue of the sexual organs of the human female (168 :) the muscular fibres are very evidently seen in the uterine horns of the cow, the mare, &c., where they affect the same arrangement as the small intestines; the same is true of the cervix, where their direction is chiefly transversal, and of the broad ligaments, where they constitute several distinct bundles.

§ VIII. DIFFERENCE ACCORDING TO AGES.

193. In the early periods of uterine life, the ovary, very large, and particularly very much elongated, forms a sort of yellowish sac, which is uninterruptedly continuous with the Fallopian tube, as in fishes. Very small in proportion, very slender, and almost lost in the middle of the broad ligaments, it is thicker the nearer we come to the vagina, above which it terminates by a neck that is soft, very projecting, and of a considerable size; at the ninth month the vagina is very long, and wide enough to admit of the introduction of the finger; its mucous membrane, as well as that of the cervix, is very evident; but the body of the womb is so firm, that it would be difficult to separate its different tissues. From birth to puberty the genital organs of the young girl undergo no special change; nothing in them discloses the great part they are destined at some period to play in the economy, and they merely follow in their evolution the progress of that of the constitution. At the age of from twelve to eighteen years, they awake from their long stupor. The womb rapidly attains to double the size it had previously acquired, both in breadth and thickness; the base of the wedge, which it resembles, instead of remaining low down, rises higher up, and thenceforth the woman commences a new era. Although not so marked, yet the changes that take place in the ovaries and Fallopian tubes are not the less undeniable.

As long as a woman has had no children, the genital organs remain in this state; after one or more pregnancies, the ovaria become covered with protuberances, wrinkles or cicatrices, and they still increase a little in size. The tubes, almost strangers to

the great revolution operated in the general system, scarcely differ from their condition previously to the first pregnancy, or from what they will be at a ripe age, unless affected by diseases, of which they often become the seat; the form and proportions of the uterus remain unaltered, only it continues of a rather increased size.

The vagina becomes shorter and wider, while the strength of the round ligaments is more or less augmented. In old age the ovaria are atrophied, become elongated, and of a very irregular shape; the womb tends again back to its original size; the cavity of its body becomes so contracted, that the stricture which connects it with the neck is sometimes found to close it completely up, as has been very judiciously indicated by M. Mayer.

§ IX. ANOMALIES.

194. The anomalous conditions of the sexual apparatus, which are as numerous as they are diversified, all seem to depend upon a want, an arrest, or an aberration of development, or on a disease occurring anteriorly or posteriorly to the period of birth.

195. No authentic case exists of a complete and simultaneous absence of all the internal female organs of generation; but Chaussier, Madame Boivin, M. Dugès and Cassan, have made mention of a person who had only one ovary, one tube, and so to speak, only one half the uterus. The absence of the ovaria has been ascertained, in more than one instance, although the other parts of generation were in a natural state: only one was absent in the case mentioned by M. Jadelot. M. Renauldin has seen them reduced to the smallest possible size in a woman about forty years of age; the Graafian vesicles may fail to become developed in them, and that necessarily occasions sterility.

196. The tubes are rarely found wanting, nor do they often deviate from their ordinary direction; but they occasionally become accidentally closed, sometimes near the ovary, and at others at a point nearer to the uterus.

197. M. Renauldin gives a very remarkable case of absence of the uterus: the cervix alone existed in a rudimental state. This fact is confirmatory of those previously reported by Bousquet, Theden, Engle, Lieutaud, M. Caillot, and of the one recently made public by M. Breschet. Sometimes the womb is very much elongated, as in the monkeys; it is oftener found divided into two equal or unequal portions, either partially or completely, internally or only externally, and sometimes on both surfaces at once. Sometimes there is a sort of accidental sac superadded to the natural organ, into which it opens, as in the case related by Dionis: or, on the contrary, with which it has no communication, as in the example given by Canestrini. Most generally the division is at the median line, either externally and at the fundus, as in one instance furnished in the *Leipsic Commentaries* and another

related by Eisenmann, or on the posterior surface, as in Morgagni's case, or on the fundus and both surfaces at the same time; and then the womb, really two-horned, resembles more or less that of the quadrupeds. Sometimes the division comprises only the superior part of the organ, which at other times is separated quite down into two portions; sometimes the two horns unite at an acute angle, and touch at their corresponding surfaces; in other cases they affect a transverse position, and only unite at the upper end of the vagina, so as to form the cervix. Internally, the septum is also far from being always of the same magnitude. At times it is only a little spur that divides the fundus of the uterine cavity into two sinuses, as in the example cited by Eisenmann. In the specimen deposited at the Museum of the Faculty, by M. Dupuytren, it is simply represented by a double median crest, attributable to an hypertrophy of the natural vertical columns of the cavities of the body and cervix. This septum may stop at the superior part of the cervix uteri, or descend as low as into the vagina; it may be complete, and divide the womb into two perfectly distinct cavities, or may be pierced in some portion of its length, and allow one of the cavities to communicate freely with the other. The neck itself may be single, as in the instances related by Bauhin, Sylvius, Riolan, Celti, Purcell, Marquet, Ferlan, Tiedemann, Madame Boivin; or double, as in the cases of Grosel, Mademoiselle De la Marche, Cruger, Bartholin, Haller, Litre, De Tressan, Eisenmann, Callisen, Böhmer, Tiedemann, MM. Lallemand, Dupuytren, Dumeril, Dubois, West, Cassan, Récamier, Garnier and Ollivier D'Angers, and in a case that I saw in a womb, the account of which was recently published by M. A. Bérard.

198. In all these cases, the uterine orifices opened into a simple or double vagina, according to circumstances; but in a subject dissected by Saviard and Duverney, one of them opened into the rectum, while the other maintained its natural disposition. A similar case may be found in the works of Valisnieri; at any rate, whether the *os tinæ* be simple or compound, whether it be the termination of a two horned womb, or of one of a perfectly natural form, it is not extremely uncommon to see it terminate in the rectum, the bladder, or urethra, or even in the hypogastrium, above the pubis.

199. Is it now necessary to remark that the question so long debated, as to double uteri, resolves itself into a mere logomachy? If by double uterus we are to understand the simultaneous existence of two wombs, each possessed of two tubes and two ovaries, it is clear that none such have been met with; if, on the contrary, to constitute this condition it is only necessary to have a more or less complete division of the natural uterus into two equal or unequal parts, each one having its own tube, ovary, cavity and

cervix, there are too many examples, it is an anomaly too often observed, and too easy to be explained according to the laws of the animal economy, to permit us to entertain the shadow of a doubt about it at the present day.

200. The gestative organ is subject to other irregularities. M. Baudelocque discovered, and had a drawing made of a preternatural canal, which extended from the right tube to the cavity of the neck, passing in the substance of the parietes of the womb. Madame Boivin also makes mention of a kind of irregular canal which seemed to form a communication betwixt the ovary and the superior part of the vagina; and perhaps there is no great difference between this anomaly and the canal mentioned by M. Gartner. Several authors have spoken of wombs obliterated either wholly, or in part; either by a primitive faultiness of the development or accidentally; the cervix uteri may present a considerable length and size, as in the remarkable cases cited by Bichat, MM. Lallemand, Segard, Gardien, &c., and its position may be deranged by preternatural adhesions, which fix one of its faces or edges too near the margin of the pelvis, either in front, on one side, or backwards. The ovaries may escape from the pelvis through the openings at the groins, descend into the upper part of the labia pudendi, or pass over to the side opposite to that they ought to occupy, and become entangled with the tubes in such a manner as to be extricated with difficulty, as in a case that fell under my own notice.

201. Vicious conformations of the vagina are not less frequent than those of the womb. Its total absence is pretty common. MM. Boyer, Caillot, Willaume, and an infinity of others, have seen it terminate in a *cul de sac* above the vulva, and not open externally at all; in some cases its vulvar opening exists, but is obliterated above and does not extend to the uterus. All the students of the school of Paris may have seen a woman of this conformation a few months since in the wards of the Hotel Dieu. I have observed a similar disposition in a woman of about thirty years of age, who had been delivered of a child five years previously, and had not had her menses since that period.* In M. Sue's case the rectum

* I have now a patient under care who is about 19 years of age. The external organs are well formed. The pudendum being covered with hair as in a healthy individual. Upon separating the labia it is found that there is no vagina. A shallow *cul de sac* is all that exists at the bottom of the vulva. A style in the urethra and a finger in the rectum enable me to know that no vagina is interposed between the rectum and the urethra. The uterus, or what is supposed to be the uterus, is so large as to occupy the whole excavation, and to be felt two inches above the brim of the pelvis by a hand externally applied. The patient has suffered for several years from monthly attacks of the most violent pain, which is only to be mitigated by large anodyne doses. Hoping to find a portion of vagina attached to the cervix, Dr. Randolph, by means of horizontal strokes of a bistoury effected an opening which was large enough to receive the thumb, and at least $3\frac{1}{2}$ inches in depth—yet no vagina

opened into the vagina, and the vagina into the bladder; nevertheless, the vulvo-uterine passage may open into the bladder of urine, without the bowel being at all deviated from its natural course, as is proved in the cases related by Maret, Palfin and Cassan; the vagina is more frequently found to terminate in the rectum at various distances from the anus. The septum which divides it is pretty often composed either of a simple frænum, connate or accidental, situated transversely, or parallel to its axis, near the vulva, or cervix, or towards the middle of the canal; or, of a valvular fold, more or less strong; or, of a real diaphragm. I have observed all these differences both in the living and dead subject. This septum may give to the vagina the appearance of two united cylindrical canals, each having a hymen, as occurred twice to Callisen and once to Eisenmann, or a single external opening, as noticed by Bartholin and Haller; sometimes it exists only above and below, and allows the two vaginæ to communicate with each other, about their middle or near the neck; most frequently, as remarked by Majocchi, Bœhmer, Cassan, &c., it does not reach to the vulva, and further, is in general only the continuation of a similar disposition of the womb.

202. If such observations were good for nothing but to satisfy an idle curiosity, I should not have dwelt so long on them; but many of them are closely concerned with the practice of tokology; others explain several phenomena, of which it would be otherwise difficult to give any account; sterility, several kinds of extra-uterine pregnancy, superfetation, retention of the menses, fecundation and delivery through the anus, and want of menstruation, are cases in point. When the womb is double, if the woman becomes pregnant in one side only, and there are, meanwhile, two orifices, quite separate from each other in the vagina, two different persons, although equally learned, may establish a very different diagnosis, even during labour. Two distinguished physicians, says Tiedemann, met together to see a woman who supposed herself on the point of lying in; having touched her, one declared

was discovered, nor could we learn where the cervix uteri was placed. This artificial vagina was kept dilated with a golden bougie, which at last was abandoned on account of the pain and irritation it caused. The distress of the patient increased *pari passu* with the monthly growth of the pelvic tumour, which we supposed to be the womb filled with menstrual blood, and hermetically enclosed. As a last resource, it was determined to tap the womb, and accordingly Dr. Randolph with great precaution, pushed the point of a curved trocar at least $2\frac{1}{2}$ inches in a direction perpendicular to the surface of the tumour. No fluid followed the puncture. The patient had a slight fever afterwards, from which she recovered in a few days. Such is the lamentable situation of this young and estimable girl. The agonies she endures at each menstrual period are pitiable.

For a case of atresia vaginæ in which the womb was tapped, a remarkably successful operation performed by Dr. Randolph, see the *Phil. Prac. of Midwifery*, by C. D. Meigs, p. 360.—M.

that the neck was in a natural state; the other found it dilated, and said that the head was engaged. Another examination showed them that the neck was double. M. West laid before the Academy of Medicine a nearly similar case, collected at the *Maternité* of Paris: at the commencement of the labour one of the pupils not only thought that dilatation had not begun, but that the neck was not quite effaced; the other found it dilated nearly one inch; the woman having died in labour, the post-mortem examination showed the reason of this difference of opinion; the womb, which was double, terminated by a double os tincæ in the vagina.

203. If by imagining laws we could compel nature to obey them, I should be content to say with Tiedemann and Meckel, that a majority of the irregular conformations of the genitalia are only instances of a persistence of their primitive, but natural state of organization; that the uterus bicornis, for example, depends upon this, that the two half cylinders which are said to constitute its first rudiments, have disobeyed the laws of conjunction discovered by M. Serres; but, unfortunately it happens in this as in most other cases, the motives, the causes escape our research, and these brilliant conceptions have but one fault, and that is, they do not agree with actual observation. I am bold to affirm, from numerous researches, that the womb and vagina in reality present, from their very first appearance, the same form, and the same general characters, as those they possess after their complete development.

§ X. HERMAPHRODISM.

204. A being in whom two sexes are united is called an *hermaphrodite*; this name, according to fable, is derived from Hermaphrodite, the son of Mercury (*Ερμης*) and Venus (*Αφροδιτης*), who was condemned by the gods to unite his body to that of Salmacis for having despised the charms of that nymph. Often debated in the courts of justice in times past, and by the physiologists of all ages, the question of hermaphrodisism or androgyny, almost wholly abandoned towards the close of the last century, seems on the point of coming up again to divide the opinions of the learned. In the monœcious plants, in zoophytes, and various mollusca, such as the oyster and snail, the two germs are found to exist in the same individual; but the sexes are observed to be separate in the diœcious vegetables, and in the animal kingdom, in worms, insects, and also in fishes, reptiles, birds, and mammiferous animals. So that hermaphrodisism in the human species is, at least to all appearance, contrary to those laws that preside over the grand distinctions of living beings. Notwithstanding this, M. Tiedemann, setting out on the principle that the embryo is at the beginning neither male nor female, admits the possibility of hermaphrodisism, and his opinion is maintained in Germany by M. Meckel and

several other physiologists. It is true that a strange assemblage of organs has been frequently noticed, which, though in the same subject, appeared to belong to different sexes; but all cases of this sort, when divested of the marvellous with which ignorance or the love of the marvellous has clothed them, may be easily classed with some kind of monstrosity of one or the other of the sexes. No individual has ever been seen to possess both the male and female genital organs. On some occasions an enormous clitoris has induced the belief that the individual was at once male and female, and, like some of the gasteropoda, capable both of fecundating and being fecundated. Sometimes it is a slightly developed penis, an hypospadiæos, a slit in the scrotum,* that have been mistaken for a vulva and clitoris, as in the case recently presented to the Academy by M. Ruillier, and that which all the physicians in Paris may have had an opportunity to examine in a man who exhibited himself for a long time here to the public. At other times it is either a prolapsion or a prolongation of the cervix uteri which inexperienced observers have mistaken for a penis, as happened with the judges of Toulouse in the famous affair of Margaret Malaure.

In certain cases, however, one might be considerably embarrassed in forming an opinion: a person who possessed all the external characters of a pretty woman, presented herself to M. Marjolin, and begged him to examine her and inform her to which sex she belonged: in the labia of a pretty well formed vulva, the professor felt two oblong tumours, which were of the size of the male testicles; there was a vagina which terminated in a blind sac behind the pubis, and the bladder opened under the root of a body, which bore a much stronger resemblance to the penis than to the clitoris. Professor Mayer dissected a child six months old, that had no vulva, but a penis perforated with an urethra, and on the sides of which were observed two small roundish tumours inclosed in a fold of skin, and yet it had an uterus.

* A case of doubtful sexual character presented itself to me in a new-born infant, two years since. The vulva was normal in appearance, except that the anterior commissure was at the lower, instead of the upper edge of the symphysis pubis; and that there were two small tumours in the lower part of the *labia externa*, about the size of male testicles. From the centre of the symphysis pubis, there projected a well-formed penis—in size and appearance—except that there was no urethral canal. There was a meatus urinarius, however, under the arch of the pubis from which the urine flowed with the ordinary freedom.

This child lived only a week; but the parents positively refused a post-mortem investigation.—H.

205. I think, without, however, being able to affirm it, that the person examined by M. Marjolin was a female, with congenital hernia of the ovaries and preternatural development of the clitoris : M. Mayer's case was certainly a girl, also affected with hernia of the ovaries, and whose vagina opening into the bladder, was continuous with the urethra.

206. It may therefore be admitted, agreeably to the sentiments of M. Marc, that hermaphrodism is only apparent, and its species may be divided into three genera : one in which there is monstrosity in the male ; the second, in which the feminine sex cannot be mistaken ; and the third, in which it is not so easy to characterize the individual. The Memoirs of the Academy of Sciences, those of the Academy of Dijon, the Philosophical Transactions, the Bulletins of the Faculty of Medicine of Paris, a Memoir by M. Pierquin, almost all the scientific collections, a work by the learned German professor Burdach, contain numerous cases more or less analogous to those I have above analyzed.

CHAPTER II.

FUNCTIONS OF THE SEXUAL ORGANS.

ARTICLE I.

OF MENSTRUATION, OR THE CATAMENIAL DISCHARGE.

207. PUBERTY, or the marriageable age, is announced in girls, as it is in boys, by numerous changes. The general organization, which, until that period, had progressed alike in both beings, seems suddenly to take an opposite direction in each. The young girl becomes more timid and reserved ; her form becomes more rounded, her voice alters, but to take on a softer and more harmonious tone ; her bosom is developed ; the cellular tissue extends from the front of the breast and the hypogastrium, as from two centres, towards the neck, while it at the same time proceeds to form a soft cushion for the upper part of the limbs. Her eyes, which are at once brilliant and languishing, express commingled desires, fears, and tenderness ; the sensations she experiences, and the sense of her own weakness, are the causes why she no longer dares to approach the companions of her childhood but with a downcast look. On the other hand, the gentle modesty that animates her countenance, and the seductive graces of her demeanour, soon disclose a power whose existence she never suspected, and which renders it true to say that the marriageable age in the softer sex is the spring tide of nature and the season of the pleasures ; but a new function, the catamenial, the absolute compass of good or bad health in women, is established with more or less difficulty in the midst of this great revolution, and by the disorders or accidents which it involves, sometimes dashes with bitterness those happy seasons to which it should naturally serve as the prelude.

208. *Definition.* Menstruation consists in a sanguineous discharge from the sexual parts. It is a natural function, to which women have in all ages of the world been subject. The suppositions of Emmet, of Roussel, of M. Aubert, &c., who think that the menses are the result of civilization,* appear to me wholly unfound-

* It was early in the history of the world that the angel promised

ed. Neither is it true that the women of the arctic pole, the aborigines of Brazil, and of some other countries in America, are exempt from them. Nothing, however, of the kind exists in animals, with the exception of the ourang-outang, some of the monkeys, and the bat, which, according to some naturalists, are subject to a periodical discharge. If, in other species, such as the quadrupeds, the cetaceæ, birds, &c., we sometimes find that a coloured mucus escapes from the cloaca or vulva, it will be, in general, only at the approach of the season for copulation, and it would be unreasonable to compare this phenomenon with the function of menstruation.

209. The menses, still known among the common people as the *règles*,* *lunes*, *mois fleurs* or *flueurs*, *purgation*, *affaires*, and *epoques*, appear at puberty, and cease with fecundity, during pregnancy, and while the woman gives suck. As soon as they appear, fecundation is possible, and as long as they continue to return at the natural period, we may conclude that the woman has not conceived. Observers have often made mention of women who were not regulated, and had never been so, but who enjoyed, nevertheless, a good state of health; it is to be observed, however, as remarked by Linnæus, that they were sterile. I am acquainted with a lady who is not regulated, ruddy, and of a good size, in blooming health, married for ten years, whose greatest desire is to become a mother, but who has lost all hope of becoming so; her husband, moreover, is young, loves her tenderly, and before he married her had begotten a child by another woman. I have seen another at the hospital of Tours, who had never *seen any thing*, as she expressed it, but who, notwithstanding, was the mother of a strong and healthy son of fifteen or eighteen years of age. It seems to me to be almost certain that the absence of the menses generally depends upon some faulty conformation of the womb or its appendages; so that it may be easily conceived that it is generally

a son to Sarah when “she was old and well-stricken in age, and when it had *ceased to be with her after the manner of women*.”

And it was at but a little later period that Rachel said to her father “let it not displease my lord, that I cannot rise up before thee, *for the custom of women is upon me*.”

In the early history of our race, it would seem, too, that women menstruated as they do now, seven days. The Levitical law commanded “if a woman have an issue of blood in her flesh, that she be *put away seven days*, and that whosoever toucheth her shall be unclean.”—H.

* I have left the French terms in this place untranslated, for they are insusceptible of translation. I have preferred to give in a note, the English names in common use. They are menses, flowers, monthly discharge, show, regular discharge, monthlies, time, and most commonly they are alluded to with a nod.—M.

a sign of sterility. Deventer and Baudelocque have known women who were never regular except during pregnancy, and I have collected several similar cases.

210. *Eruption.* In our temperate climes the menses commence between the twelfth and sixteenth year; a little earlier, from eight to twelve years, in southern climates; and a little later, from fifteen to twenty years in the north. Some travelers even pretend that the Turkish women are capable of becoming mothers at the age of seven or eight years. Dr. Prideaux, for example, relates that Cadijah, aged five years, was regular when Mahomet espoused her. But this story, like most others that come from countries of whose manners and customs we know so little, is only a popular tale, for I find in a faithful translation of the Koran, that Cadijah was upwards of forty years old when she married the prophet.—Others tell us, that near the poles, and on the northern slopes of mountains, it is not uncommon for the menses not to appear until the twenty-third or twenty-fourth year.

211. The discrepancies presented by opposite climates in mass, is found to be true in the details in every country, and occasionally in every province and city. A country life and occupations, simplicity of manners, a frugal regimen, like the temperature of northern regions, procrastinate the first menstrual epoch; a life of leisure, the imitative arts, such as painting and music, the habit of frequenting balls, the theatre, lascivious books and pictures, good living, the use of stimulating drinks, and living in populous cities, tend on the other hand, like the temperature of the equatorial attitudes, to accelerate its appearance. It is less precocious also in a robust woman, of a lymphatico-sanguine temperament, very fat, and whose sensibility is not very acute, than in those who are thin, delicate, nervous, irritable and sanguine. Even at Paris, girls are occasionally observed to become regular at ten, eleven and twelve years: I know two who were so, one at nine and a half, and the other at ten and a half years; and I am in the habit of visiting a family where a young lady, who at fourteen, is as tall and robust as the majority of women at twenty, has been entirely in a state of puberty since she was eight years and a half old. Children are also spoken of who were regular at birth, or between the first and fifth year of their age, but it is reasonable to suppose that this discharge must have been owing to some disease, or at least had nothing in common with the catamenial flow. On this subject I cannot, however, withhold a case recently made public; it is that of a young girl at Havana, whose menses appeared first when she was eighteen months old, and have since that continued to return once a month; the child, moreover, has a bosom, a very decided character of countenance, and all the marks of anticipated puberty. Other persons also are seen at this capital, who did not menstruate until their seventeenth, eighteenth, nineteenth, or twentieth years.

Osiander noticed at Gottingen, that of one hundred and thirty-seven women, nine became regular at twelve years of age, eight at thirteen, twenty-one at fourteen, thirty-two at fifteen, twenty-four at sixteen, eleven at seventeen, eighteen at eighteen, ten at nineteen, eight at twenty, one at twenty-one, and one other at twenty-four years of age.

Preceded, commonly, by a sense of general lassitude, of uneasiness in the limbs, of weight in the loins, of heat, of tension in the epigastrium and perineum, by a slight pruritus of the sexual parts, by a mucous discharge, that is clear or yellow, and more or less abundant, it happens also that the first eruption of the menses is in many women effected without its being announced by any precursory symptoms; it is then really abundant, nor does it commonly last more than two or three days. In general they do not become regular until after three or four periods; in the succeeding appearances, the discharge lasts variously from a few hours to a week, but the average term is four or five days.

212. The quantity of blood that escapes amounts, according to Hippocrates, to two cotylæ, or to eighteen ounces according to Galen. Haller computes it at six, eight, or twelve ounces, and Baudelocque at only three or four ounces; in general it is more profuse in persons and places where its appearance is most precocious, so that European women who go to inhabit a warm climate, as for example Batavia or Java, often perish in consequence of their profuse menstrual evacuations. M. Desormeaux has remarked, and I have also had occasion to observe it, that country girls who come to Paris to go to service, not unfrequently find that their menses are stopped or considerably diminished. As the different periods are not always alike in the same woman, as they are sometimes more abundant or less so every second or third period, alternately, it is impossible to have any certain data on this subject. Again, as the blood that flows from the organ can only be collected on cloths or in water, it is manifest the observer must frequently make up an erroneous opinion, and that he ought to count upon obtaining merely approximative results.

213. *Nature.* The minds of the ancient physiologists were strongly exercised in regard to the catamenial blood. It is similar, says Hippocrates, to that of a slaughtered animal; or again, according to Aristotle, to that which flows from a simple wound. There are now but few opponents of this system among medical men. But very different ideas prevailed at Rome in the time of Pliny, and are still very commonly upheld among the public. If we might believe the celebrated Roman naturalist, the menstrual fluid, endowed with the most noxious qualities, would be considered as a dangerous poison, whose exhalations alone are sufficient to turn all the sauces of a whole kitchen, the cheeses of a whole dairy, to make a whole family sick, and wilt all the flowers

of a parterre; travelers inform us that even now, in some parts of America, women are so much dreaded during their menstrual periods, that they are forbidden to go out of doors except in cases of urgent necessity; and further that they are obliged to wear a mark that advertises people of their situation, so that they may flee out of their way. While ridiculing, as they deserve, such fables as these, the moderns have perhaps too much neglected that portion which may be true. It is very rarely that a vulgar prejudice does not contain some truth. If we reflect on the odour derived from the different secretions of animals, or the aroma exhaled from the skin of certain women, is it fair to reject without distinction all that has been said in relation to the menstrual excretion? I am certainly far from giving credit to the peculiarities related by Pliny, Columella and the Arabians; but I do not see why the miasms that escape from a female during the flow of her menses, should be incapable of turning a fluid so easily affected as milk, nor why it could not possibly have the same effect on certain sauces. Besides, it is evident that blood retained for some time within the sexual organs, particularly women who are inattentive to cleanliness, may, by being decomposed, acquire certain deleterious properties.

Its odour is too variable to permit us to compare it to the marigold, rather than to any thing else. From its being found fluid, although long retained in the womb, we are not authorized to conclude with M. Lavagna, that it contains no fibrin; we too frequently see it escape in clots from women who get up to walk about after having been long in a sitting posture, to be able to say with Dionis, that menstrual blood never coagulates. According to all appearances, it contains less fibrin than that from other parts of the body, but is not entirely without it. Being mixed with the mucous and serous matters naturally furnished by the internal surface of the genital organs, the menstrual* blood is thus rendered more viscous; and ought not to exhibit the same characters as that which escapes from a wound.

214. *Progress.* The menstrual fluid is, in most women, at first

* Several modern authors maintain that the menstrual flow is a hemorrhage and not a secretion.

Madame Boivin says, "La qualite du sang des menstrues ne parait pas different de celui qui circule dans tout le système lorsque la femme est saine, bien conformée, et qu'elle fait usage des moyens que la santé et la propriété exigent." And M. Moreau holds the same opinion.

"Cette fonction," says he, "consiste dans *une évacuation de sang* plus ou moins abondant, qui se fait périodiquement, et chaque mois par les organes sexuels."

Professor Jackson, too, is a decided advocate of this hypothesis.—H.

very liquid, serous, scanty, and not high coloured ; its consistence and quantity increase on the second day ; on the third it is in almost every respect similar to the blood that escapes from the nose in epistaxis ; the fourth restores to it the characters of the second, and on the fifth its appearances are analogous to those of the first : sometimes, on the contrary, the evacuation has a slower course, and is not really abundant until the fourth or fifth, while in others the blood flows from the commencement in as great a quantity as on the second or third days. In some cases it appears one day, does not return the next, and flows in abundance afterwards. It most commonly comes away in the shape of simple small drops, which flow fast, and some women are obliged to be very careful to prevent it from falling in quantities to the ground.

215. The *periodical return* of the menses ordinarily takes place every month, as their name indicates, or rather every twenty-eight or twenty-nine days which brings them into relation with the lunar periods ; in an infinity of people they are observed to recur at nearer or remoter periods ; sometimes only twenty-two, twenty, eighteen, and even fifteen days elapse between each catamenial revolution ; I know a person who is never more than twelve days free from it ; and I have the care of another who is almost always affected with it, but who in other respects is in good health, only she is thin, and of an extreme sensibility. These frequent returns of the menses, without any peculiar change in the health, are particularly to be observed in warm countries, and in nervous women. The emaciation which attends this state is at the critical period frequently succeeded by plumpness more or less decided, as if the sanguine discharges to which nature had become accustomed were now turned to the benefit of the whole organism !

Others are regular every thirty-second, thirty-fifth, or fortieth day, and even every two or three months, without being in the least incommoded, as is pretty frequently observed to be the case in Greenland, Lapland, and other cold countries ; and neither is it uncommon to observe the same thing in our own country places ; but none of these anomalies contradict the principles established by physiologists in all ages.

216. Without daring to set up the simple results of my own observations in opposition to those who assert that all women are regular in the first fortnight of the month, half from the first to the eighth, and the rest from the eighth to the fifteenth, I cannot refrain from stating that I have seen as many who were menstruating at the close as at the beginning of each month in the year ; I therefore do not believe it possible to establish any thing certain on this head.

217. *Causes.* Physiologists have been for a long time divided in regard to the causes of menstruation, and at the present day even, every thing seems to indicate that there will not be a unity

of sentiment very soon on this point. Some authors have stated, with Aristotle and Galen, Simson, Astruc, and M. Lobstein, that the menses depend upon a general or local plethora, upon a superabundance of blood: others, with Osiander, pretend that the menses are occasioned by too large a proportion of carbon and azote being contained in the blood of the uterus. Dr. Clifton refers them to the relative weakness of the venous parietes, and to the perpendicular effort of the blood. Paracelsus, Silvius, and De Graaf think they are produced by a principle of fermentation; Stahl and M. Dugès suppose they arise under the influence of an *irritamentum* or peculiar *molimen*; Emmet, who attributes them to an erection, and Lecat, who qualifies them as an amorous phlogosis, suppose them to be the effect of venereal desires. But who does not herein perceive that vain show of words so prodigally made use of in ancient physiology, or, that such suppositions as these only serve to protract, without solving the problem?

218. The *periodicity* of the menses has not been explained any better than their general cause. Aristotle, Vanhelmont, Mead, and even our elegant Roussel, attributed it to the influence of the moon. From the physicians, this opinion has passed among the people, and the poets have converted it into a proverb by the following verse:

Luna vetus vetulas, juvenes nova luna repurgat.

But to show its fallacy, we need only recollect that the same woman may be regular at different lunar phases, once in the space of several, or even of one single year; however, this is a point on which there is need for new researches, and for the complete clearing up of which, numerous observations would be required.

219. Many attempts have been also made with the view to ascertain the final causes of menstruation, but it must be confessed with equally ill success. What in fact is proved by saying that this function disposes and maintains the uterus in a state apt for fecundation; that its suppression during pregnancy permits the ovum to grow and be developed without weakening the female? It is generally quite well known that conception does not take place until the menses have appeared, nor after they have ceased to return; but the why and the how are not known: they are the sign and not the cause of fecundity; the absence of the menses does not produce sterility; but women who do not menstruate are often found to be sterile, because, in either case something is wrong in the state of the genital organs.

220. *Seat.* The seat of the menstrual discharge is another subject on which the naturalists continue still to dispute. The Greeks, the Arabians, and a majority of writers of all ages place it in the uterus; but Columbus, Severin Pineau, Bohn, as well as a crowd of moderns, and among them M. Désormeaux, have seen the

menses escaping immediately from the vagina, or the different parts which constitute the vulva; the uterus, it is said, cannot furnish them when they flow during pregnancy.

221. It appears to me to be easy to reconcile these opinions. The blood of the menses undeniably comes from the uterine cavity in the majority of instances; facts the most multiplied and authentic prove it incontestably. Thus, in persons whose menses had been long suppressed, in consequence of disease, or had never appeared, in consequence of some faulty organization of the vagina or vulva, the womb has an hundred times been found full and distended with blood; in others who died while menstruating, the cavity of the womb has been seen covered with ecchymoses, and sometimes filled with clots of blood. If the os tincæ be confined in the cupule of a pessary with a cylindrical opening passing through it, the blood will be found to escape therefrom: when there is a prolapsus, it may be seen distilling from the cervix; and in the natural state, we find by placing the finger between the lips of the os tincæ, that the fluid escapes from the part.

222. On the other hand it is equally certain that it has sometimes been seen to exude from the interior of the vagina or vulva; I do not perceive, indeed, how it can be otherwise in a woman who continues to menstruate during her whole gestation. But these cases are exceptions, anomalies, and do not invalidate the general rule: menstruation is then deviated from its general route, as is the case when it takes place from the urethra, the rectum, the pulmonary passages, the breasts, or some portion of the tegumentary surfaces. These irregularities, moreover, are rare, and appear to have been in more than one instance the effect of real disease.

223. *Source.* Attempts have been made, also, to ascertain the immediate source of the menses, one party placing it in the veins, along with Vesalius; in the arteries, with Ruysch; or the capillaries, with Winslow and Meibomius; others think it is to be found in certain particular glandules, as Lister; or in peculiar little receptacles, as Simson; or lastly, with Astruc, in a supposed set of venous sinuses. There are as many gratuitous suppositions as there are opinions, all of them referring to a question as idle as it is difficult of solution. The menstrual blood escapes from the womb by exhalation or by perspiration, as in all the hemorrhages of the mucous membranes, but without our being able to learn whether it transudes from the venous rather than from the arterial capillaries, and *vice versa*. In this respect, whether the discharge be derived from the body or cervix of the womb, from the vagina, or elsewhere, the mechanism of the function is always the same, and that is what it imports us to know.

224. *Cessation.* The age at which the menses cease to appear is not less variable than that of their first eruption. Most generally

it is from forty-five to fifty years;* but some women are exempted at the age of forty, or even at thirty-six, thirty, twenty-six, or twenty-four, as in the instances cited by Haller and others, and of which I also have known several. Some continue to menstruate without any inconvenience until fifty-five, sixty, sixty-five, and even seventy years of age. Cases are related of persons who have lost them at the usual period, and become regular again at eighty, ninety, ninety-five, or, according to the report of Blancardi, even at one hundred and five years of age. But, as M. Désormeaux remarks, although these kinds of return are not rare at sixty, seventy, or seventy-five years, it is at least certain they ought rather to be considered as the sign of some disease, than as a real resumption of the menstrual function. However, in the fact itself, there is nothing which the laws of the animal economy render incomprehensible. In the same manner as certain plants sometimes flourish a second time in autumn, after having been withered at the close of spring, so, also, a woman may, under certain circumstances, return, as it were, to her young age again, when she is just touching the decline of life. It is a last effort of nature to restore a more prosperous season, but which serves, unhappily, only to hasten a dissolution which she in vain desires to retard. Thus it appears that, in the natural order, the menses ought to cease between the fortieth and fiftieth years in our temperate climes; between thirty and forty in warm climates, and from forty-five to fifty under the colder zones: in other words, their whole duration is everywhere, near about thirty years; where they are precocious they disappear sooner, and where their appearance is more tardy they are also prolonged to a later period of life. All cases that are in opposition to this general rule, ought, in my opinion, to be registered as among the exceptions, or regarded as pathological.

225. The change of life (*age du retour*) is marked by the gradual disappearance of the charms of puberty; the bosom and the cheeks become flaccid, the skin is wrinkled, appears to be too large, and loses its delicateness; the eyes sink into the orbits; the carnation of the cheeks is supplanted by a yellowish tint; that empurpled blush which once, amidst smiles, sat on her rosy lips, is chased away by a bluish and leaden hue; every circumstance proclaims that the season of the pleasures is past, and that she can no longer rely on the attractions peculiar to the sex. It is, therefore, very properly, that this period is called the *critical time* or *critical age*; but attempts have been erroneously made to justify these epithets, by reference to the numberless dangers with which, according to the general opinion, women are at this period sur-

* A majority of women in the city of Philadelphia cease to menstruate at fifty years of age.—H.

rounded. In fact, the statistical researches published by Moret and Finlayson, MM. Chateaufneuf and Lachaise, prove that not more women than men die between the ages of forty and fifty years. Nevertheless, the menses rarely cease suddenly, or without occasioning some disorder; on some occasions their suppression is preceded by a gradual diminution of the duration of each period, and of the quantity of blood lost; or, on the contrary, by an increase which sometimes converts them into a pretty abundant hemorrhage; sometimes they cease, return again to cease and return, before a final stop is put to them; they become irregular in character; a mucous discharge is established; lassitude, sense of suffocation, nervous complaints, even severe diseases occur in some cases; but in others, also, nothing of all this is observed to happen, and the health, which up to that period had been precarious, becomes quite confirmed; strength is restored; the emaciated individual grows fat, and finds nothing but benefits in the loss of her catamenial discharges.

ARTICLE II.

OF REPRODUCTION.

226. Designed for the perpetuation of species, reproduction is a function peculiar to living beings. Inert bodies are produced, but never reproduce. Without contradiction, reproduction constitutes one of the most astonishing phenomena of animated nature: and how many efforts have been made, from the beginning of time until now, to ascertain its mechanism! Indeed, ought not man, whose prerogative it is to think, first to endeavour to understand himself? Can any thing in the universe interest him so much as his own origin? Yet these efforts so multiplied, these researches so ably conducted, and these labours, of all sorts pursued so perseveringly by the most celebrated men, have hitherto scarcely served to any other end than to show him how deep is the mystery that veils the commencement of his existence.

227. Pythagoras and his disciples said that the embryo is formed out of the menstrual blood, and a kind of moisture that descends from the brain during coition, and that it is developed according to the laws of harmony.

228. Empedocles and Hippocrates, who are not less obscure than the former on this subject, thought that both the male and female enclosed the molecules of embryos of both sexes, and that these molecules were united in the womb during the sexual union.

229. Aristotle, with certain modifications, reproduced the idea of Pythagoras, and by an ingenious metaphor, made of the womb

a real sculptor's shop, where the women furnished the marble, the man brought the workman, and the embryo represented the statue.

230. Galen set forth an opinion diametrically opposite to that of the celebrated naturalist of Stagyra; he insists that the embryo is produced from the semen of the male, and that the material furnished by the women serves solely for its nourishment.

231. R. De Graaf thought he could demonstrate that all animals come from an egg, and says that in the human species itself, the germs exist in the ovary, in the form of ovules, or little transparent vesicles. The ancient doctrine, entitled the system of *mixed germs*, was soon generally abandoned, while the new hypothesis, known as the *system of ovules*, spread with the rapidity of lightning. This is the doctrine that prevails at the present day; but as may well be supposed, it has not reached the nineteenth century without having experienced numerous modifications. According to De Graaf, Meckel, &c., the little ovule is only a kind of rudimental embryo, which is only waiting for life in order then to commence its own development; and this life can only be imparted to it by the prolific semen of the male; according to Ruysch and Haller, the seminal liquor is conveyed unaltered, by the Fallopian tube, to the ovary, while others think that a very subtle vapour, an *aura seminalis*, only is detached from it, and which produces the same effect; several writers have advanced the opinion, that the semen, at first absorbed in the vagina or uterus, and carried from thence into the torrent of the circulation, does not return to the ovary to fecundate a vesicle until it has undergone several elaborations.

232. Soon after the discovery of the ovules, Ham, Harstoecker, and Lewenhoeck affirmed that the germs exist, quite formed, in the reproductive fluid of the male; that these germs, which they called *animalcules*, are living; that a single drop of sperm contains many thousands of them; that being projected in the act of coition into the uterine cavity, they all perish with the exception of one or more, which are fortunate enough to reach the Fallopian tube; that one of them reaches the ovary, enters and lodges in a vesicle prepared for that purpose, and afterwards returns to the womb in the shape of a little ovum, &c. Hence is established a new system, since called the system of *animalcules*, a system which gives to man an immense share in the act of fecundation, while the ovular hypothesis, as understood by De Graaf, attributes almost the whole of it to the woman.

233. Harvey, supported by the munificence of a great king; Haller, with his extraordinary talents; Spallanzani, with that good faith and spirit of observation for which he was so remarkable; for the purpose of clearing up this great question, multiplied their experiments almost infinitely, and their labours have led, or seem to lead, to this common conclusion, to wit, that the

union of germs takes place in the ovary, and that the development of the product of fecundation is a simple *evolution*, and not an *epigenesis*, as was formerly maintained.

234. Nevertheless, the doctrine of *epigenesis* has never been wholly abandoned; Maupertuis still defended it in his *Venus Physique*, published in 1754, asserting that the seed of the two sexes is formed of particles that are never commingled save in the womb, just as certain chemical elements mutually attract and combine with each other. Buffon was even very near reviving it, by presenting it in a new light: this celebrated writer supposed that at the moment when the venereal enjoyment was at its greatest height, there were separated from every portion of the body, and of the two conjoined bodies at the same moment, a determinate number of organic molecules; that each of these molecules possessed a figure proportioned to the part of the body from whence it was disengaged, but which are similar in the two sexes; that having reached the uterus, all the similar molecules are mutually attracted towards each other, so that, for example, those that were furnished by the eye, the nose, the ear, or the arm, the lung, or the heart, or finger of the woman, can only combine with the molecules from the eye, nose, ear, arm, lung, heart or finger of the man.

235. Not one of these opinions is wholly destitute of foundation; not one but has been defended with talent, and combated by very good arguments; none without its partisans and antagonists; but the nature of this work not admitting of my entering into very long details so as to exhibit the just value of each of these doctrines, I shall leave the subject with what has been above said.

236. Reproduction, in those beings that occupy a high grade on the zoological scale, is an extremely complex act; in order to a good understanding of it as a whole, it ought to be analyzed, in some measure, in the several gradations of the animal kingdom. In the first place, it is proper to remark, that the words *reproduction*, *generation*, *fecundation*, *conception*, have each a distinct grammatical acception, and it is wrong to employ them as synonymes, especially when speaking of mammiferous animals. The word *reproduction*, for example, is applicable to the whole function, while *generation* ought to be understood as meaning the simple creation of germs; the term *fecundation*, in its turn, only expresses the act which unites the two germs, or by which one of these germs vivifies the other; the word *conception*, which signifies to *retain* can only be reasonably employed to designate the action which causes the fecundated germ to be retained within the sexual organs; lastly, the word *reproduction* is the general term, while the three others belong only to separate phenomena, which may either exist unconjoined or altogether, according to the class in which they happen to be observed.

237. Thus polypi, which reproduce themselves by germs, have generation, but no fecundation nor conception. The batracian reptiles also produce germs; but these germs are of two species, those of the male, and those of the female; they must be mixed in order for reproduction to take place, but as the mixture is effected exteriorly, the batracians have no conception, although they have both a generation and a fecundation. In birds there is retention of the fecundated germ, and consequently, *generation*, *fecundation*, and *conception*. In the mammifera and man, the vivified and conceived germ is developed within the animal; and there is, further, in these cases, *gestation*, and even *expulsion* or *parturition*, at the end of pregnancy. The function of reproduction then is composed, in the human species, 1. Of *generation*, or the formation of the germ; 2. Of *fecundation*, or the vivification of the germ; 3. Of *conception*, or the retention of the vivified germ; 4. Of *gestation* or *pregnancy*; 5. Of *parturition* or the *expulsion* of the ovum.

SECTION 1.

Of the Generation or Procreation of Germs.

238. In the infusory animals which break to pieces of themselves, and the zoophytes which we reduce to fragments that give birth to an equal number of entire beings, germs are nothing more than analogues of the general mass of the individuals from which they have been separated. Their generation is, in this respect, analogous to that of those plants that are multiplied by slips or grafts. A little farther on in the scale, germs cannot be produced except by peculiar organs which constitute the sexes, and in that case the sexes are sometimes united in the same individual, sometimes they exist in two different individuals. Snails, oysters, a pretty considerable number of other mollusca, and all the monœcious plants, are in the first case, that is to say, they are *hermaphrodites*; the diœcious plants, and almost all animals, are found in the second; so that reproduction is here bi-sexual, and the male and female germs are always furnished by different individuals.

§ I. OF THE FEMALE GERM.

239. In ascending the scale from fishes up to women, the female germ appears to be formed in the ovary (233); it is always found to present itself under the appearance of a vesicle, known by the name of *ovule*. In reptiles and birds the ovule is very large, comparatively to that of women; in all the mammifera its reproduction is extremely simple: the ovary is a gland whose special function it is to secrete ovules, as the liver secretes bile, &c. MM. Prevost

and Dumas assure us that they have proved that the ovules are really formed by the ovary, and by nothing but the ovary; that they always exist in this gland, in adult females, who are capable of fecundation; that they are not developed until puberty, and are not found in old age; that animals that copulate at all seasons of the year also have them without interruption until they become sterile, while on the other hand they are only met with at the season of copulation in those animals that have only one rutting time in each year.

240. These *vesicles*, at first very small, grow at last to the size of a hempseed. As in fowls, they do not all grow at the same time; one or two generally exceeding the rest, and reaching the state of maturity first. Their coats are then thick and opaque, rise more or less above the surface of the ovary, and seem as if they would burst its investing membrane. At this period of its evolution the germ is composed of two small coats, one external, the largest adheres to the tissue of the ovary; the other, internal, smaller, really constitutes the ovule, while MM. Prevost and Dumas propose to restrict the name of vesicle to the former.

241. After the discovery of the ovules, and particularly during the last century, philosophers were desirous to know whether they are transmitted from the mother to the daughter, together with the principles of her organs; or whether, on the other hand, they are not formed until the age of puberty. This question, which gave rise to the celebrated theory of the *encasing* of germs one within another, has been especially argued by Swammerdam, Haller and Bonnet. This latter insisted with great zeal, that we ought to carry back the origin of the human beings that now cover, have covered, or will hereafter cover the globe in all succeeding ages, to the ovary of the first woman; that is to say, that the ovaries of the first woman must have enclosed, shut up one within another, the germs of all the generations that have succeeded, or will hereafter succeed; in a word, the whole human race. But these infinite divisions, in which the imagination loses itself, have caused the idea of the pre-existence of germs to be rejected, and at the present day they are regarded as the results of a mere secretion.

§ II. OF THE MALE GERM.

242. The germ furnished by *male* animals, is a whitish, viscid liquor called *seed*, *prolific matter* or *seminal fluid*; when this liquid escapes from the urethra, it is composed of a substance secreted by the testicles, of the fluid exhaled from the *vesiculæ seminales*, and of the prostatic liquor. But which of all these various elements is the fecundating principle? It is not the *aura seminalis*; for Spallanzani could never fecundate the eggs of frogs without bringing them into immediate contact with the seminal liquor of the male. Does it result from the mixture that I have just men-

tioned? No; for the fluids furnished by the vesiculæ seminales, the prostate and the urethra, can only be regarded as the vehicle of that derived from the testicles. Does it depend upon the animalcules named after Lewenhoeck? Several authors maintain the affirmative, and their opinion has found numerous echoes in various parts of the learned world.

243. According to Lewenhoeck, the animalcules are microscopic corpuscles, endowed with the faculty of moving in a determinate direction, and for a determinate end. Their large extremity, which is also flattened, gives origin to their caudiform portion, which is delicate and very much elongated. According to some of his partisans, they may be divided into young, old, adult, weakly, strong, male and female, &c.; and Plantade, of Montpellier, under the assumed name of *Dalempatius*, refining still more on what had been already advanced upon this subject, made out of a drop of prolific liquor, a well-governed nation; he imagined a king, princess, ministers, magistrates, paupers, rich persons, merchants, soldiers, children, old men, &c. Raillery produced on this occasion, an effect that could not be brought about by the most peremptory reasoning. The animalcular hypothesis appeared to be absurd, and thenceforth nobody dared to advocate it.

244. It is true that it had already been asserted that these corpuscles exist and that they sometimes exhibit the form that had been assigned to them, but that they also appear on some occasions under another form, and that they do not in any case belong more peculiarly to the seminal liquor than to any other of the animal fluids; in a word, that they do not play any special part in the act of reproduction, or at the least, they are not the essential agents of fecundation.

245. According to MM. Prevost and Dumas, the animalcules described by Lewenhoeck do not exist except in the male organs of generation, and differ from the mobile globules of the other fluids of the organism by their form, which is always the same in the same zoological species; by their mode of progression; by the situation in which they are found, &c.; they always have an enlarged extremity and an elongated portion; their head, which is sometimes oval or almost circular, sometimes lozenge-shaped, at others resembles the catkin of the bulrush; but as it is at the same time flattened, it cannot be recognized, except when seen in front. Their point, sometimes straight, very long, and conical as in the dunghill cock, sometimes short and fine, as in the dog, at others very long and flexuous, pretty much resembles the tricocephalous worms, the slenderest worms that inhabit the human body. Upon the whole, the spermatic animalcula has a general resemblance to the tadpole of the batracians; its dimensions do not exceed one, two, or three hundredths of a millimeter; it is not

to be seen in the seminal liquor previous to the age of puberty nor in old men, nor in the intervals of the seasons at which certain animals copulate, nor in the mule, which, as is well known, is incapable of reproduction; it is not met with in the matter furnished by the urethra, the prostate, or the seminal vesicles, and it is to be found with the same characters in all those animals that are wholly or partially deprived of these organs. It is produced by the testicle which secretes it. Every prolific animal contains it in its prolific gland, and frequently in its deferent duct. The movement of these corpuscles seems to take place under the influence of a will; they always move forwards; they can be killed by an electric discharge, and thenceforth their motion ceases to be active. In escaping from the formative gland, the viscous matter in which they are enveloped is too thick to permit them to exercise any visible motion; but it is only necessary to mix them with some other liquid, or permit them to become diluted in the seminal vesicle or urethra, in order that their mobility should come immediately into play.

246. Simple microscopic globules, on the contrary, have neither head nor tail, are round or of irregular shapes, sometimes larger and sometimes smaller, and move only under the influence of some external impression, and without any determinate end. They exist in all the fluids of the economy, in the blood, in the serum, in the milk, even in the spermatic liquor, before puberty, as well as at all other periods of life, and in all animals.

247. MM. Prevost and Dumas, by their numerous experiments on artificial fecundation, became convinced that the animalcules alone constituted the germ; they never effected a vivification when the liquid they made use of did not contain them, or when these living molecules had been killed or destroyed in any way, whereas fecundation took place whenever the liquor they employed contained even a few animalcules.

248. Although the experiments of these physiologists bear marks of the greatest good faith and accuracy, I cannot, nevertheless, withhold all reference to the authorities which prevent us from adopting, excepting in the most circumspect manner, the conclusions that might be drawn from them. In Italy, Spallanzani has maintained that animalcules are completely foreign to the fecundative act; in spite of the assertions of Gleichen, the opinion of Spallanzani prevails in Germany; in France, MM. Bory de Saint-Vincent and Dutrochet are of nearly the same opinion; M. Virey regards them as containing certain small balloons distended with a kind of pollen, and which burst when they reach the organs of the other sex; and M. Raspail has very recently come out against the doctrine of animalcules, which, according to him, are nothing more than certain organic *debris*, or products of the decomposition of the sperm.

249. What among so many contradictory assertions, are we to believe? what opinion must we adopt? However it may be, we may consider it as demonstrated that the female germ is an ovule, and that that of the male is contained in his spermatic fluid, and that this liquid contains such animalcules as were described by Lewenhoeck; but that, in the present state of science, the relative importance of each of these principles is unknown.

SECTION 2.

Of Fecundation.

250. When the germs have acquired their full size, a new phenomenon, by combining some of their principles, imparts to them motion and life; this phenomenon is *fecundation*, which, as to its intimate mechanism, is perhaps always effected in the same manner, but which appears to be effected in different ways in different animated beings. Although the snail has double sex, it cannot fecundate itself; a copulation with another individual similar to itself is necessary, and then each of them fecundates, and is at the same time fecundated.

251. Just as it happens in the monœcious plants, where, so to speak, the pollen meets, by accident only, the ovary of the female individual; so in many fishes and mollusca, chance only seems to lead the male to where the female had deposited her ova, so that he may bedew it with his sperm.

252. In the batracian animals, such as the frog, although there is no real copulation, copulation is, nevertheless, requisite, and fecundation is effected while the female ova are in the act of escaping from her organs.

253. Lastly, in the ophidian animals, birds, the mammiferæ, and man, it is necessary that the germ of the male should fecundate the other in the interior of the female organs.

254. *Seat.* But the point in the organs at which the two germs meet is not yet completely ascertained. Is it in the ovary? Is it in the oviduct? Is it in the womb? All the ancients agreed that the vivification of the germs takes place in the womb, whether, like Pythagoras, they call to their aid an extremely subtle nervous principle, whether they invoke, like Harvey, a magnetic impregnation, or whether they content themselves with the seminal liquor of the male, to explain the fact: almost all the ovarists, on the contrary, have thought it could only be effected in the ovary, and a great majority of the physiologists* of the present day are of this way of thinking.

* Professor Chapman, when he occupied the obstetrical chair.

255. Among the animalculists, one party believed that fecundation takes place in the womb without any participation by the ovule, or with Maupertuis, that the animalcules attracted the ovarian vesicles to the womb in order to effect their agglomeration or germification. Others, with Andry, supposed that a single animalcule reaches the ovary, enters an ovule by lifting a small valve, and that fecundation is effected at that moment. Finally, MM. Prevost and Dumas, returning in this respect to the idea of Buffon, of Maupertuis, of Aristotle and Hippocrates, admit that the uterine cavity is the seat of fecundation.

256. To maintain this last hypothesis, they rely on the circumstance that they were never, in their experiments, able to find any animalcules in the Fallopian tubes, and, *à fortiori*, in the ovaries; while they frequently met with them in the womb or its horns: on the fact, that before the ovules can become impregnated, they must be enveloped in a coat of mucus, which they receive while in the tube on their way to the womb; that they could never succeed the artificial fecundation of ovules taken directly from the ovary, while nothing was easier than to vivify such as had traversed the tube and the oviduct, &c. But Ruysch saw the prolific matter in the Fallopian tubes of a woman who was taken in adultery and killed on the spot by her husband; Haller found semen in the seminiferous ducts of the female animals on which he experimented. Besides, are we authorized to deny the existence of a fact observed by others, because we have ourselves sought for it in vain? Have we a right to infer, because the eggs of frogs cannot be fecundated unless they have been previously more or less thickly covered with a coating of mucus, that the same thing holds true in women? Further, these ovules, which MM. Prevost and Dumas found unfit for fecundation, could not have been forcibly detached from the ovary without having been somewhat altered by the instrument; and that, too, by the admission of the experimenters themselves. Though the existence of ovarian pregnancies is far from being demonstrated; though the fact of an embryo half

taught that fecundation was accomplished by that important law of the animal economy termed *sympathy*, or the consent of parts. "The semen," says he, "first stimulates the vagina; by *sympathy* the ovarian vesicle enlarges, projects and bursts; by *sympathy* the Fallopian tubes incline to the ovaries, and, having embraced them, convey the rudiments of the fœtus to the uterus; by *sympathy* the uterus makes the necessary preparations for receiving and perfecting the formation and growth of the fœtus; and, finally, by *sympathy* the breasts furnish milk for its support after birth." And Professor Dewees taught that the semen masculinum was conveyed directly from the vagina to the ovaries by a set of vessels not yet discovered.—H.

in the tube and half in the ovary, as reported by Bussiere, requires some new evidence; though a great many cases of extra-uterine pregnancy, examined with care, are very far from being conclusive, the experiments of Nuck, who placed a ligature on the tube, betwixt the womb and ovary, directly after copulation, and upon killing the animal some time afterwards, found that fecundation had taken place, and that the ovum, stopped by the thread, had begun to develop itself in the ovarian moiety of the seminitiferous canal: those of Haighton, who found that fecundation did not take place in rabbits on that side where he had tied the tube, &c., appear to prove incontestably, that the union of the germs does not take place in the womb.

257. *Mechanism.* As to the mechanism of this union, it is still covered with an extremely thick veil. After coition, one of the vesicles enclosed in the ovary enlarges with great rapidity, soon rises above the surface of the organ, gradually thins its coat, which at length bursts; when this vesicle bursts, a much smaller vesicle, which is the real germ, escapes from it (239); this germ engages at once in the tube, which meanwhile was spasmodically applied, like a cupping-glass, to the portion of the ovary from which, during a fruitful coition, the vesicle escapes.

258. The capsule which contained the germ before it was ruptured, constitutes what has, by Valisnieri, Santorini, Cruikshank, Buffon and Home, been called the yellow body (*corpus luteum*); its rupture occasions a small bleeding wound, which cicatrizes by degrees, and leaves in its place a wrinkled or depressed scar more or less deep, and which Littre, Haller, and some others mistook for the real yellow body.

259. That which takes place in regard to a single ovule, may also occur to two, to three, or a greater number. Supposing that the evolution of the ovule is put in play by the commotion that accompanies coition, by a sort of electric commotion, by an *aura seminalis*, by means of an animalcule, or by any principle whatsoever of the prolific matter; that this principle reaches the germ directly from the woman, or that it reaches it only after having passed through the general circulation, it always happens that after a fecundation has been effected, there is detached from the ovary an ovule so modified, that it is soon recognized as a being similar to the one that produced it. This is what is demonstrated by observation; but we know nothing further about it. The systems of *preformation* or *evolution*, of *emboitement* or *panspermy*, of *epigenesis* and *catagenesis*, *expansive force*, *resisting force* of the ancients; the *nisus formativus* of Blumenbach, reproduced under a new point of view, and clothed by M. Mayer, with the philosophical jargon of the German schools, teach us nothing in relation to the intimate nature of this work, which is as extraordinary as it is curious.

SECTION 3.

Of Conception.

260. When the union of the germs is effected in the interior, the new product resulting therefrom is commonly retained, or arrested in some part of the sexual system. But this phenomenon constitutes what is properly called conception. It is evidently distinct from fecundation; for wherever the latter is effected exteriorly to the animal, as in fishes and many reptiles, conception cannot be truly said to exist, while in the higher classes it always does exist. At a first view, it might seem useless to make a distinct phenomenon of it, and that it might without inconvenience be confounded with gestation; but upon a closer inspection we are easily convinced of the contrary. Indeed the ophidians and birds have no gestation, and yet they have a conception. Conception, therefore, comprehends what takes place between the instant of vivification, and the moment when the fecundated germ begins to be developed; whether it attaches itself for this purpose to some point of the generative passages, or whether it has to be expelled in order to undergo the process of incubation exteriorly.

CHAPTER III.

HISTORY OF GESTATION.

261. IF the fecundated or conceived ovum passes out of the organs of the mother before the germ begins its developement, as in birds, there is no gestation, and the animal is called *oviparous*. If the embryo is formed while passing through the oviduct, but so that it cannot separate itself from its shell until after it is laid, as in certain reptiles, there is still, properly speaking, no gestation, and such animals are called *ovo-viviparous*. Whenever, on the contrary, the egg undergoes its entire incubation in the interior of the generative system, and the fœtus is not expelled until the development of its organs enables it to live and grow in the external world, pregnancy or gestation is said to exist; this is observed to take place in the mammiferæ only; in this case there exist a gestative organ, a single uterus, or one womb and two *ad uterum*, destined to lodge the product of fecundation until it attains its maturity, and such animals are denominated *viviparous*.

Pregnancy, in the human species, is one of the phenomena of reproduction which it most imports us carefully to study. The words pregnancy and gestation are not synonymous with the words *pregnant woman* or *woman with child*. The former express a function and all that appertains thereto, from its origin until its termination. The latter indicate merely the actual state of a woman who contains within herself a fecundated or conceived ovum.

262. *Division*. If the fecundated ovum reaches, without being obstructed, the cavity of the womb, and maintains itself there, the pregnancy is said to be *good*, *natural*, or *uterine*; if it remains and is developed in the ovary, if it falls into the cavity of the peritoneum, stops in the Fallopian tube, or becomes engaged in the substance of the womb itself, it on the contrary receives the title of *bad*, *preternatural*, or *extra-uterine*. The first species is then divided into three varieties. 1. Simple pregnancy where the womb contains only a single ovum. 2. Double, triple, quadruple, or compound pregnancy, when there are two, three, or four fœtuses. 3. Complicated pregnancy, where a polypus, a great quantity of water, or any diseased state of the product of the conception, or of the womb itself takes place.

The second comprises four varieties determined by the seat occupied by the fecundated germ; so that authors admit, 1. An ova-

rian pregnancy; 2. An abdominal or peritoneal pregnancy; 3. A tubal pregnancy; and 4. A mixed or interstitial pregnancy.

After having observed that a great variety of diseases sometimes give rise to most of the symptoms of pregnancy, the French writers, adopting a still more general first division, have established a *true* and a *false* or *apparent pregnancy*, differing from each other in this, that the former is characterized by the presence, and the latter by the absence of the fœtus; they have next described false pregnancy as ventose, serous, sanguine, polypous, cancerous, nervous, molar, hydatic, &c., accordingly as the increased size of the belly depends on the presence of gas, water, blood, polypous or other tumours in the womb, the existence of a scirrhus, an hydatiform or fleshy mole, an undefinable nervous state, &c.

ARTICLE I.

OF TRUE PREGNANCY.

SECTION 1.

Of Uterine Pregnancy.

263. As soon as pregnancy takes place, important and numerous phenomena are manifested in the economy. Of these some are local, physical, material: others are variable, transient, general: some are common to all kinds of gestation, while others are peculiar to some sorts only.

As uterine pregnancy comprises almost all of them, and further, as it constitutes the only normal kind of gestation in the human species, I shall speak, in the first place, only of those which belong to it, and shall not treat of the special phenomena until I come to the article in which I shall designate the means of distinguishing it from all the rest.

264. The constitutional movement occasioned by copulation is only momentary, both in women and in men, where fecundation is not to result from it. In the opposite case, the state of turgescence, of erection or spasm of the uterus and tubes, continues, and is the prelude to a new kind of life in the former of these organs. Its volume, its form, its situation, attitude, structure, its properties, all are about to be changed.

265. *Volume.* After a conception takes place, the womb remains in a state of fluxion, which gradually augments its size in every direction; according to some accoucheurs, this growth is

very regular and uniform until the end of the pregnancy; others assert that it is irregular and by starts. M. Désormeaux thinks it is performed very slowly in the first months, and on the contrary, with great rapidity in the two or three last; in the first case, at the expense of the walls of the organ alone, and in the last, of the walls and cavity both. Not only does the body undergo this augmentation; Madame Boivin maintains, that in the second month, the neck is almost *two inches* in length. At the end of the third month the womb is nearly two inches and a half through in every direction, and three inches and a half in the fourth month. At this last-named period, we observe in the dead subject, that the plaits near the inner orifice are unfolded, and extended in long, very delicate ridges.

266. At seven months, the superior third of the cervix has become common with the inferior portion of the body, from which it may, however, be distinguished by a rose-coloured zone, very different from the deep red tint of the rest of the womb. Its inferior portion, whiter, larger, and softer than the other, has still a dimension of about fifteen lines; but we must not here confound the neck, properly so called, with the *os tincae*, which is only five or six lines long. The neck, which is thicker below than above, is still about an inch long at eight months, and is not wholly lost in the uterine ovoid, until in the course of the ninth month, so that, from the commencement of pregnancy until the eighth month, it grows thinner, deploys and is gradually widened, without losing meanwhile much of its real length.

267. While admitting a part of these assertions to be true, I think it nevertheless more correct to say with M. Désormeaux, that if we leave the *os tincae* out of the question, the neck loses about one-third of its total length by the fifth month, one half in the sixth, two-thirds or three-fourths in the seventh, three-fourths or four-fifths in the eighth, and the remainder disappears in the course of the ninth.

268. At full term the vertical diameter of the womb is twelve inches in length, the antero-posterior nine inches, and the transverse eight and a half. At the level of the tubes, its circumference is about twenty-six inches, and only thirteen at the uterine portion of the cervix, which, according to Madame Boivin, ought then to be five inches higher than the external orifice. Levret says that the superficies of the womb, which, when unimpregnated, is only equal to sixteen inches, is three hundred and thirty-nine at the commencement of labour; that its cavity, which is four-fifths of an inch in the former case, rises to four hundred and eight in the latter; that its mass, which is only four inches and a third before pregnancy begins, is fifty-one at child-birth; but the cavity of the womb is evidently carried too far by Levret, for in this way it

might hold seventeen pounds of water, while the whole ovum in general does not weigh more than from seven to ten pounds.*

269. *Form.* Instead of remaining flattened on its two surfaces, the womb becomes rounded, and soon grows of a pyriform shape. The vaginal angle seems to contract; to grow *smaller*; its orifice sometimes becomes circular, or ceases to represent a simple linear or transverse slit, particularly in first pregnancies; on other occasions it is pretty largely open, its lips become thicker and softer, chiefly in those women who have borne several children. In some instances of first pregnancy, it seems to close completely up, so that it can scarcely be distinguished by the finger.

270. The womb next gradually assumes the form of an oval, with its point downwards. Its posterior wall, which was, even before impregnation (155), more protuberant than its anterior one, grows so disproportionately that the tubes seem to descend considerably, until their roots appear to answer to the point of union of the posterior two-thirds, and anterior third of the uterine circumference. Its fundus also enlarges very much. Of dimensions nearly equal in every direction, about the fifth or sixth month the organ of gestation exhibits the figure of a spheroidal vase terminated by a very short neck; it might be compared to a hog's bladder, with the urethral extremity served round with thread for the space of an inch or two: supposing that some one should now unwind the thread by degrees, from above downwards, while another blows into the bladder from the fundus, so as to distend it, we can acquire a pretty clear idea of the gradual effacement of the apex of the womb.

271. At the close of pregnancy, the neck is nothing more than a ring, formed merely by the lips of the os tincæ, and the thickness of which varies according as the woman is in her first pregnancy, or as she has already had several children. In the former case, this ring scarcely exists; a circle that grows thinner and thinner, and sometimes quite sharp at its edge, is ordinarily substituted for it; in the second, it pretty often retains a thickness of two, three, or four lines, until labour comes on. Its orifice remains habitually closed; its lips are smooth, even and thin, even to the last, in those who have never borne children; in others it gapes a little at an early period; I have in many cases been able to introduce the end of my finger into it, in women who were five and a half or six months gone, and who were used for the purposes of the practical lessons of my lying-in room. Wider and softer below, it is then found to be harder and narrower above; its cavity resembles a pretty long finger of a glove, so that we can touch the naked

* A patient under my care gave birth to twins, one of which weighed in the scales, $8\frac{1}{2}$ and the other 8 pounds; the placenta was at least 1 pound, the water 10 ounces = 18 pounds.—M.

membranes, and ascertain the position of the child several months before the end of pregnancy.

272. *Position.* At the same time that the length and volume of the womb are increasing, it undergoes other changes, both of its postures and relations to other parts; the cervix is depressed, and approaches nearer to the vulva: this phenomenon, which is very decided in some women, and scarcely appreciable in others, is most frequently met with, and is observable for a longer time in women who have the pelvis large, and who are of a soft or naturally lax fibre; and less commonly in those of an opposite constitution, although it is not a rare thing to find it in young and robust women, even in a first pregnancy; but the *os tinæ* does not fail to rise up by degrees; at three months, it is about at the same place it occupied before impregnation; after this, continuing gradually to rise, it sometimes gets as high as the sacro-vertebral angle, while, on the contrary, it begins in other instances to descend again, at about the sixth, the seventh or eighth month, and approaches pretty near the inferior strait.

273. The *fundus*, which at the third month is not higher than the level of the superior strait, rises two finger breadths above it in the course of the fourth, approaches to the navel in the fifth,* gets on a level with that central point, or even above it, at the end of the sixth, still goes upwards in the seventh and eighth, but never reaches either the diaphragm or liver, nor does it ever fill up the epigastric region, as has been hyperbolically or thoughtlessly stated by some of the standard authors. I have observed that it often remains in the meso-gastric region until labour takes place. Besides, with some exceptions, it can scarcely happen otherwise, for in the last months of pregnancy, the centre of the pelvis is often from fifteen to eighteen inches distant from the navel. However, the womb, being burthened as it were with the weight of the ovum, seems to sink or to be somewhat crushed downwards; which compels it to enlarge proportionably in the transverse and in the antero-posterior diameters, which until then it had not done.

274. *Direction.* While the womb remains unconstrained in the excavation, and its fundus is not arrested by the base of the sacrum, its posterior half, forming a larger mass than its anterior half, tends to make it turn over backwards, so that as the *os tinæ* sinks downwards, it inclines forwards, sometimes more, sometimes less, and gets farther from the sacrum, and nearer to the pubis; a deviation that is favoured by the alternate fullness and emptiness of the urinary bladder. Imperfectly supported in front by the abdominal parietes pressed upon through the medium of the viscera by the diaphragm, and particularly as the woman, in order to maintain her

* The fundus does not rise as high as the umbilicus, until the end of the *sixth* month of gestation.—H.

equilibrium, is obliged to carry her head and shoulders somewhat backwards, the womb, as soon as it is sufficiently enlarged to touch the promontory, can no longer rise except in the line of the axis of the superior strait. Applied posteriorly against a solid, salient and rounded part, it with difficulty preserves its station on the median line, as it proceeds upwards into the abdomen, almost always deviates to one side or the other, to the right eight times out of ten, so that one of its sides, the left, if the inclination is to the right, and the right if it is inclined to the left, soon turns forwards; whence it happens, that its anterior region looks a little to the right in the former instance, and to the left in the latter; in a word the womb seems to have turned on its great axis.

275. The inclination of the womb to the right rather than to the left, has been explained in a hundred different ways. The presence of the rectum, habitually filled, in pregnant women with hard stercoraceous matter, has appeared to some persons sufficient to account for it; but the right lateral obliquity is to be met with also in persons, who are not of a costive habit, and even in individuals labouring under diarrhœa. M. Désormeaux adds, that while rising into the abdomen, the organ of gestation is thrust to the right by the mass of small intestines, and the sigmoid flexure of the colon; which depends, says he, on this, that the mesentery, fixed on the front of the spine, descends obliquely from right to left. But there is an error as to the fact here, for the mesentery is directed from left to right; and I am astonished that M. Désormeaux, in general so correct, should have overlooked it; besides, though the sigmoid flexure of the colon is on the left, the cæcum, which is still larger, is on the right. Others have thought with Levret, that the insertion of the placenta, by restricting the dilatation of one particular portion of the womb, might occasion lateral obliquities to take place. In the first place, it is not true that the portion of the womb in contact with the placenta enlarges less than the other parts of the organ? and further, even if we could admit the fact, it would be necessary for the placenta to be attached almost always to the right, which is contrary to what is found to be the case. Madame Boivin attributes right lateral obliquity to the excessive strength of the right round ligament of the womb; but in that case the right angle of the womb ought not to be so distant as it is found to be from the right abdominal canal. I could more willingly admit, that being unable to rest upon the front of the spine, the womb generally inclines to the right, in consequence of the individual's habit of sleeping upon that side, and of using the right arm rather than the left; but it would be further necessary to prove that in women who have the opposite habits, the right obliquity is never met with.

276. While the fundus and body of the womb incline forwards and to the right, the cervix generally tends backwards and to the

left ; however, it would be wrong to suppose it must be always so : the orifice may remain in the centre of the excavation, although the anterior or lateral obliquities may be very great, or it may even be directed further backwards than is indicated by the position of the fundus. I have frequently found its plane parallel to the anterior surface of the sacrum in the last stages of pregnancy, although there was not any anterior inclination ; it may also be turned to the right, though the fundus is inclined to that side, which is a much rarer case.

277. *Thickness of the walls.* Galen, Paul Æginette, and Mauriceau also have advanced that the uterus grows or distends only at the expense of the thickness of its walls ; Riolan, Deventer, De La Motte, and Roederer, on the other hand, have maintained that this thickness increases during pregnancy, while the moderns admit that it remains as it was previously to fecundation. Such discrepancy of opinion upon a fact easy to be ascertained, looks, at a first view, very strange ; but let it nevertheless, be explained with reference to the situation in which the observers were placed. The ancients, as they could not open dead bodies, were compelled to reason from analogy ; seeing that the coats of the bladder grow thin in proportion as they become more and more expanded, and that the same thing, in a large number of animals, holds good as to the uterus and its horns, they did not suppose it could happen otherwise in the human species. Besides, they might find their opinions upon the fact, that in women dying with uterine hemorrhage during labour, or in the last three months of gestation, in those affected with hydrometry, or in whom the ovum contains too large a quantity of amniotic fluid, the muscular coat of the womb is indeed very thin, and sometimes reduced to one half, a third, and even a quarter of its natural thickness.

Others might have been induced to defend a diametrically opposite sentiment, because during the first eight days after parturition, a period in which more childbed women die than in any other, the parietes of the womb, in contracting, really thicken so much as to be an inch, or even fifteen lines through, at the fundus. But, since numerous opportunities have been enjoyed of interrogating nature in a better way, hypotheses founded on false analogies or on exceptionable or badly explained cases, have given way before the truth.

278. It is now known that the womb preserves nearly the same thickness during the whole course of pregnancy as it had when unimpregnated ; (I say nearly, for sometimes it is a line or two thicker or thinner :) that this thickness, always greatest at the insertion of the placenta, generally diminishes from the fundus towards the cervix, where it is frequently found to be not more than two or three lines, or even less ; that it increases a little in all parts of the organ at the same time, until the third or fourth month, and then

remains rather below its primitive limits, except the cervix, which at that period, especially, grows thinner, to exceed them again in the last stages of pregnancy. It is, therefore, useless to argue against the opinion of Jenty, who maintains that this thickness is much more apparent than real, and that it is solely owing to the accumulation of blood in the uterine vessels.

279. *Structure.* In its unimpregnated state, the organization of the womb seems to be only incipient; it is perfected, or developed, in pregnancy (169); its fibres which were pale, dense and inextricably tangled, soften, become redder, and soon represent layers and bundles easy to detect and to follow. The cellular tissue which was before so firm, dense, and elastic, relaxes, becomes supple, and indeed resembles the common cellular tela, and in this way permits the other elements, which it held in bondage, as it were, to follow the impulse that animates the whole womb. The arterial branches folded upon each other a thousand times, like the vas deferens, and bridled in this condition by dense, elastic laminæ, cede to the general relaxation, and gradually become lengthened; their angles, at first so sharp, with their doublings, grow blunter, enlarge, and at last exhibit only certain zig-zags of greater or less depth, tortuosities which do not impede the circulation, and their calibre, before the end of gestation, comes to be double, triple, and even quadruple its diameter previous to fecundation.

280. The *veins* undergo the same metamorphoses: already, in the natural state, larger and less tortuous, they enlarge, and are developed still more rapidly than the arteries; at term they are observed to furrow the fleshy layer in every direction, and form a net-work which in some measure separates it into two planes. They are large enough to admit a goose quill, and in some instances, even the end of the little finger; near the mucous membrane they dilate so as to constitute cones with inverted bases; cones described by Astruc, under the name of *uterine sinuses*, but which Haller restored to their proper nature by denominating them *venous sinuses*; and to which Hunter thinks no particular name should be given.

281. The *lymphatic* vessels are, according to Cruikshank, so amplified that they may, by injecting them with mercury, be made as large as crow-quills, and to form a kind of coating of silver to the surface of the womb; the *nerves* themselves, according to Hunter, also increase sensibly in size; which accounts for certain alterations of function we shall have occasion to treat of in a subsequent page.

282. The *mucous* membrane, the existence of which it is so difficult to demonstrate in the unimpregnated state, becomes more evident, redder, more villous; distinct shreds of it can be separated; the folds which it forms for the purpose of enclosing the

ridges of the cervix, relax and disappear, but not until the last half of pregnancy; the serous coat is also far from being unaffected by all these changes, and Bichat was evidently mistaken when he asserted that the peritoneum, like the other diaphanous membranes, possesses no extensibility. At the end of pregnancy, the mesorectum remains; the broad ligaments, and other folds, though tightened, are not effaced, yet lose some of their proportional dimensions, and even somewhat of their absolute dimensions. Besides, admitting that they do become completely unfolded, their laminae would be insufficient to cover a circumference of twenty-six inches. It is evident, then, that the serous coat increases in the same proportion as the fleshy coat of the womb; that it is extensible, and remains in contact with the same points of the subjacent layers, from the commencement to the end of gestation. I have even remarked, as M. Ristelhueber has, that, instead of becoming thinner, it rather increases in thickness, and that its adherences scarcely relax at all while it is undergoing this amplification.

283. *Functions and properties.* In proportion as the uterine vessels deploy themselves, the blood is determined thither, and at last the womb, like a sponge, is gorged with that fluid; however, the menses are suppressed as soon as fecundation is effected, and some physiologists have attributed to this circumstance most of the modifications which are then experienced by the womb; but we cannot adopt such an opinion, for the same changes are observed in women who continue to be subject to a periodical discharge during pregnancy, and where the uterus is distended by a polypus, while they are not met with in a case of simple amenorrhœa. Traversed by larger nerves, and receiving a larger supply of vivifying fluids, the uterus enjoys a livelier sensibility: in the unimpregnated state it may be touched, struck, pressed upon, without, so to speak, causing the woman to feel any pain; during the growth of the ovum, on the contrary, the least jar, the least touch of the fœtus is instantly felt by the mother; both its sensibility and contractility are of a grade almost as high as that of the organs of relation.

284. To explain the extraordinary development of the uterine cavity, the ancients taught that the ovum dilates it by growing, just as we can dilate a glass tube by blowing into it, as we distend a bladder by filling it with a fluid or air, or as we can spread out a ball of soft wax. Puzos has not rendered this hypothesis more sustainable, by calling to its support the laws observed by fluids in transuding from without to the inner side of any inert vessel; for as, in physics, the force of impulsion of fluids is measured by the height and thickness of the column, it is clear that in this case, the distending effort would increase in an inverse ratio to the resistance; that, from being very feeble at the begin-

ning, when the density of the organ is considerable, it would at the close be doubled ten times to overcome a less difficulty. Would it be any better to say, with Van Helmont, that the womb dilates spontaneously under the influence of a *blas météorisant*, or to admit, with Levret and the moderns, that like the heart and the erectile tissues, it grows *actively*, and by the mere force of its vital properties? But in reasoning thus, the fact is explained without indicating the cause. It is at least certain that the dilating force, altogether foreign to the product of conception, exists in the gestative organ itself: a circumstance that beyond question proves this to be the case, is, that in preternatural pregnancies, as remarked by Levret, Brandi, Meckel, Chaussier, &c., the uterine cavity, though empty, dilates as it does in an ordinary gestation.

285. To explain this dilatation, it is useless, with Malpighi, to refer to a fermentative principle contained in the semen, or with Blumenbach, to a peculiar vital action; the turgescence occasioned by fecundation, and kept up by the ovum, affords a very satisfactory reason for it: the congestion, of which the womb is the seat, invites to it an excess of nutrition; the new molecules incessantly deposited there, necessarily elongate its fibres; the vascular channels are both uncoiled and enlarged at the same time, and as this unfolding and elongation cannot take place without increasing the extent of the curves or circles represented by each fibre and vessel in the organ, it follows that the amplification of its cavity must be an inevitable consequence of the augmented nutrition of its parietes.

286. Moreover, the ovum and the womb enlarge both together; and though the end or the function of the thing contained is not to enforce the distension of that which contains it, it at least serves to support its parietes, and to keep up its due measure of irritation. In this, as in all other cases, nature finds the means of multiplying effects without augmenting the number of causes.

287. *Appendages of the uterus.* The changes effected in the position, size, and weight of the womb will of necessity occasion some alterations in the disposition of the circumjacent parts.

288. In consequence of the depression of the cervix during the first months, the vagina becomes shorter and wider; at a later period being drawn upwards along with the uterus, it becomes elongated, and at length forms a kind of cone with the apex at the vulva. By means of the fluids it imbibes it becomes softened: its anterior and posterior columns sometimes acquire a very considerable size, especially near their lower ends.

289. The *Fallopian tubes*, retained by the broad ligaments against the sides of the womb, enlarge, become redder, more vascular, and, as it were, spongy on the inner surface of their funnel-shaped portion.

290. The ovaries, which are depressed in the same way, also increase in size; their vessels dilate, sometimes become varicose, so as even to burst, and occasion a fatal hemorrhage.

The fibres of the *round ligaments* are better expressed, enlarged and redder, so that at the period of labour, they compose two real muscular cords, whose contraction is in certain cases so evident, that I have in three different women observed it myself, and also pointed it out to several persons during the contraction of the womb for expelling the after-birth.

291. The *bladder* rises above the superior strait; the urethra is concealed behind the symphysis of the pubis, becomes almost vertical, its orifice retreats under the summit of the pubic arch, and the introduction of the catheter in pregnant women, is thus rendered more difficult; it may also happen that the urinary bladder, being more forcibly compressed above than below its fundus, may project against the upper part of the vagina, making a tumour there, of which I have often met with cases in the latter half of gestation.

292. The *rectum* being, as it were, strangulated above, and no longer receiving any impulsion from the diaphragm, becomes distended with stercoraceous matters, and in that way interferes with the form of the posterior wall of the vagina.

293. The *small intestines*, being raised upwards by the fundus of the uterus, in front of which they are sometimes partially placed, may be in that way so compressed as to occasion colic pains of a more or less violent character; at other times their most movable portions engaged in the recto-vaginal excavation, where they are liable to be strangulated and give rise to very serious affections; but they are most frequently thrust towards the lumbar regions, or else mount directly up, pressing against the arch of the colon, the stomach and liver.

The diaphragm itself being pushed upwards into the thorax, whose base it enlarges, while its vertical diameter is lessened, is in some degree hindered from executing its contractile movement.

294. The skin on the lower part of the belly becomes thinner, is covered with whitish blemishes and streaks, arranged in zigzag or curved lines, with the convexity downwards; its meshes enlarge like that of a piece of stuff that yields upon being stretched, without, however, tearing. After the lying-in it appears to be covered all over with reticulated scars, and becomes wrinkled or covered with plaits; in short women, as observed by M. Désormeaux, and I will add, in those where the abdomen attains to a very considerable size, this state of the skin is propagated as far as the thighs and breech.

295. The *aponeuroses* become frayed; the inguinal ring enlarges a little, but the linea alba undergoes the greatest changes because it is more peculiarly charged with resisting the weight of the womb and the viscera; instead of one inch, it sometimes is four

inches wide at its middle; towards the end of pregnancy we find in its place nothing more than a tissue or net-work with meshes more or less supple.

296. The *navel* opens a little, grows more salient and thinner, which renders the occurrence of umbilical hernia very easy. In a great many women there is such a separation of the aponeurotic fibres upon the median line, that it seems as if it were pierced with a lozenge-shaped, or elliptical opening, the ends of which approach sometimes nearer, sometimes less near to the epigastrium or pubis. Further, in this case there is left, after the labour is over, an oblong tumour, a kind of eventeration, which is sometimes increased by subsequent pregnancies to such a degree, as to permit the womb to turn very much over in front, above the superior strait.

297. The pressure exercised by the womb upon the *vessels* of the pelvic excavation necessarily impedes the venous circulation of the surrounding parts; the external organs of generation, too, and the lower limbs, are often seen to be infiltrated, covered with varices, and affected with considerable pain; pains that may depend upon the compression of nerves belonging to the lumbar and sacral plexuses.

298. The *pelvis** relaxes, and its articulations, so firm and solid, change so much, as in some women to become quite movable. Avicenna, Ætius, Fernel, and most of the ancients, had doubtless observed it, for they placed rigidity of the symphyses among the causes of difficult labour; this opinion however was pretty generally abandoned about the time of Paré; for S. Pineau, vigorously opposed by the surgeons of Paris for having maintained it, never could convince them of it, until he exhibited the body of a newly-delivered woman who had been executed. Since then, Bertin and Bouvart, in a celebrated thesis; Smellie, Levret, Plessman, Piet, Desault, M. Boyer, Baudelocque, Béclard, Chaussier, Madame Boivin, &c., have admitted the softening of the pelvic articulations: some as a constant occurrence; others as an exception; some as a state proper to facilitate parturition, as a wise precaution of nature; others as a dangerous disease. At present the existence of the fact cannot be doubted, and all the questions relating to this long-debated point are of easy solution. Reason indicates, and observation proves that the ligamentous bands of

* Most of the Lecturers on Midwifery, in this city, maintain that no relaxation of the ligamentous bands that surround the symphyses of the pelvis, take place during parturition; but that the intervening cartilages are designed to prevent, by their elasticity, the effect of blows upon the bony girdle. My own observations, however, lead me to unite with Velpeau in his views upon this subject.—H.

the pelvis become more soft and supple in many pregnant women ; and that, in common with all the surrounding parts, they contain a larger quantity of fluid ; but it is impossible for such an afflux of fluids to take place without the articular surfaces being separated. This process, however, is so moderate in a majority of cases, that neither the woman nor the accoucheur perceives it. Smellie has seen it carried to such an extent that the bones could be made to ride over each other ; Denman also mentions cases of considerable separation ; Madame Boivin says it is not uncommon to find a distance of four, six, eight, ten, and even twelve lines between the pubes, and naturalists are aware that in some of the *mammifera*, the bones of the pelvis, too narrow to permit the birth to take place, separate so widely during gestation, as to be in a manner lost in the soft parts.

299. In these cases of extreme softening, standing and walking, which in some individuals are both fatiguing and painful at the close of pregnancy, may produce inflammation and suppuration of the symphyses, numerous examples of which are upon record ; in these cases, too, it is right, as Baudelocque teaches, to class their mobility among the pathological alterations : on the other hand, we may conceive that in a slightly contracted pelvis, such a softening may to a certain extent have a beneficial effect upon the labour, as has been asserted by several authors ; but for promoting this softening, is it proper, in accordance with Pineau, to repose any confidence upon the action of baths, cataplasms, and other means of the same nature ? Is it possible, without any bad effect, to increase it by mechanical efforts, such as dilating efforts, for example ? Can we believe with Denman and others, that the pressure exerted by the child's head has something to do with its production, when the labour is violent, and yet progresses slowly ?

According to Baudelocque, the ligaments alone share in this operation : MM. Piet and Chaussier are wrong in teaching that the cartilaginous plates are equally concerned in it.

The symphysis of the pubis, being in almost all respects similar to the articulation of the bodies of two vertebræ, explains why the softening affects it more frequently, and always to a greater degree than the posterior symphyses ; and how it happens that in a majority of women who have borne children, its surfaces are commonly rather more distantly separated than they were before pregnancy took place.

300. The consistency even of the bones of the pelvis is sometimes so altered, that they become flexible. Weidman relates a remarkable instance of this kind : the inferior strait was so contracted, that the Cæsarian operation appeared to be indispensably necessary ; but in attempting to pass up his hand, he perceived that the ischia and the pubic arch yielded like cartilage, and the labour terminated without an operation. M. Hofmeister has lately

published a case nearly similar, and not less curious. According to Burns and other English accoucheurs, this state of things often exists as a symptom of the dangerous disease they describe under the title of *malacosteon*.

§ II. SYMPATHETIC PHENOMENA, AND RATIONAL SIGNS.

301. The numerous material modifications that have just been enumerated, act more or less upon the rest of the system, and give rise to what are by agreement denominated the *general, common, rational, vague, uncertain, and doubtful* signs of gestation.

302. It is a common notion, long ago inculcated by Hippocrates and Galen, that a fruitful copulation is accompanied with much livelier enjoyment than an ordinary coitus, and that it is felt at the same moment by both the parties. According to Aristotle the copulative organ of the male is withdrawn less moist than commonly from the female organs, and the seminal fluid does not escape from them. Immediately after coition the two beings fall into a state of languor, of weakness, of uncommon sadness; the woman feels a disposition to faintness, to syncope, to have horripilation, colic, and a sort of vermicular motion which seems to proceed from the womb and pass to the iliac fossæ or flanks; borborygmi, first in the uterus, which seems to be full of gas, and then throughout the whole abdomen, and sometimes a general shivering, beginning in the abdomen, complete the series of symptoms which announce that fecundation has taken place.

303. This first condition is succeeded by pregnancy, properly so called. The *eyes* lose their vivacity, their brilliancy, have an expression of languor, and seem to sink in their orbits; the *eyelids* grow dark and are surrounded with a blackish, livid, or leaden circle; the *nose* grows sharper and longer; the *mouth* widens by the separation of its corners; all the features of the face seem to retire backwards, which renders the *chin* more prominent; the *face* becomes pale, is covered with spots of various sizes and numbers, sometimes reddish, or of a more or less deep brown; sometimes, but more rarely, of a dead or milk white colour; in a word it becomes masked.

The *neck* swells, becomes softer, and is the seat of a congestion, which, according to Diogenes, was formerly indicated by Democritus, and which Catullus has mentioned in the following lines:

Non, illam nutrix, oriente luce, revisens,
Hesterno collum, poterit circumdare filo;

a congestion which Dumas says he has positively observed.* The

* There is more poetry than truth in the lines of Catullus. The feet become less swelled, and the neck and face more swelled by a night spent in the horizontal posture, and the lines are as applicable to men as they are to women.—M.

breasts enlarge, become more tender, firmer; sometimes a few drops of whitish serosity can be extracted from them: the nipple rises and is more prominent; the areola enlarges and grows visibly browner: the delicacy of their tegumentary layer increases, and they also occasionally exhibit some whitish stains, analogous to those on the face.

304. The *pulse*, at first embarrassed, acquires a greater degree of frequency, and then of force and hardness; it becomes larger, fuller, sometimes irregular, and somewhat bounding, quick and feverish; towards the term of labour, it is found to be, says Bordeu, convulsive-like, intermittent and corded; in fine, the artery seems to be more tense, beats with more frequency and velocity; the circulation being more active, hemorrhages are commoner and more dangerous; blood drawn from a vein, or escaping accidentally from the organs, is found to be covered with a sizzly coat, of variable thickness, according as the fibrin or crassamentum happens to be above or below the natural proportions. The *temperature* of the body rises, and enables pregnant women to bear cold better than others; the insensible *transpiration* is also more abundant, and at the commencement yields an odour of prolific matter, but which afterwards becomes acrid or of a peculiar nature. The *urine* flows more abundantly, is cloudy, and contains a larger sediment; all the *secretions* are more energetically effected; the saliva, in particular, is often furnished in great quantity, so that some women are attacked with a real *ptyalism*. The *liver*, being deranged in its secretions, is said to occasion the stains or ephelides of the face and skin.

305. The sense of *taste* and the digestion are still more specially perverted; anorexia, nausea, and even vomiting supervene, and are frequently followed with a complete loss of appetite; the woman now desires for food none but the most singular and sometimes disgusting objects. At one while her greatest happiness is to eat clay, ashes, lime, or to craunch charcoal; at another she places her delight in half putrid meat, spiders, or other unclean animals: in general she is displeased with fat, and an animal regimen; fruits and vegetables suit her better; some ardently desire sour drinks, and love none but food prepared with vinegar, as salad, &c.

306. This state of inappetency and disgust is succeeded, after the few first months, by a very decided appetite, in some cases almost voracious, by easy digestion, fondness for wine and other spirituous drinks; but in the last third part of pregnancy, the digestive functions again become disturbed, doubtless because the stomach, being at that period too small, can only take in very small quantities of food and drink.

307. The *moral* condition of the female is also subject to pretty numerous changes: some women, naturally gay, good tempered,

and amiable, become sad, melancholy, cross, unsociable, and *vice versa*. In a good many women, the passions, although previously moderate, acquire an extraordinary violence, cannot be subdued, and cause the commission of the most atrocious crimes; in others, there are merely some singular desires, such as to eat a particular kind of fruit or meat or game, or some particular dish, no matter at what price; an irresistible tendency to steal objects of small value, or for which they have no use, and corruption of their manners or character. There are some whose wit is never more lively, more penetrating, more agreeable: while others fall into a sort of stupidity and apathy quite unnatural in them. In general the activity of the intellectual faculties is augmented, whether in the whole, or only in part; in one case the memory, or a taste for the arts or sciences, is modified; in others the judgment becomes exquisite, or the imagination is exalted to such a degree, that some women have, during their pregnancy, attained to a surprising degree of perfection in those works of genius, those arts or sciences, which they had previously cultivated with indifference and without success; some lose their senses and become crazy, always at the same period of their pregnancy; others are seen in whom mania never disappears; and who never become composed except during this function.

308. Many *diseases* supervene, are suspended, or disappear; sometimes odontalgia, without any caries of the teeth, is renewed every time the woman becomes pregnant; sometimes neuralgia, whether suborbital, facial, or of any other sort; chorea or St. Vitus's dance; convulsions, or other motions, hysterical or epileptiform; in other cases, pulmonary consumption of a very advanced stage seems to retrograde, or even gives place to a highly flourishing state of health; a pretty considerable number of different diseases, such as chronic or obscure inflammation of the lungs or digestive passages, and serious and profound organic lesions, are affected in the same manner. But although it is true that after parturition some of the affections that are happily modified by gestation do not return, it is but too certain that a major part of them thenceforth progress towards a fatal termination with frightful rapidity.

309. Such is the series of sympathetic phenomena* noticed in

* *Kiesteine*, another rational sign of pregnancy, was first noticed by M. Nauché, of Paris, in 1831.—Since that time we have had communications upon the subject, by Drs. Eguisier, Bird, McPhuturs, Perry, and others; but the honour of establishing the unquestionable value of *kiesteine*, as a diagnostic sign of pregnancy, was reserved for my late highly talented pupil and friend, Dr. Elisha K. Kane.—During a sojourn of a year, as Resident Physician at the Philadelphia Hospital,

pregnant women by accoucheurs: it has been seen that they are numerous; but, unhappily, every one of them may exist; they may even be met with altogether, without the patient's being pregnant; while, on the other hand, pregnancy often takes place without giving rise to them. Besides, how can we rely upon those that depend upon sensations experienced during or immediately after coition? Women, like all the rest of the human race, easily believe what they desire, and are willing to conceal even from themselves what they dread. They therefore will or will not experience such and such symptoms, accordingly as they do or do not wish to be pregnant. How can we subsequently recognize among the disturbances or disorders of the mind that which appertains to pregnancy, and distinguish it from that which is occasioned by perverseness, or that which depends upon actual disease?

310. Be this as it may, there are a great many cases in which, by proper attention, an able accoucheur can make excellent use of the rational signs, in forming his opinion. For example, when the *mask* on the face is rapidly manifested in a woman who has never had it before, who lives in a large city, and is not exposed to the heat of the sun, it becomes a very probable sign of pregnancy. The same may be said of the violet circle round the eyes, and of the swelling and sensibility of the breasts, when they are independent of the menstrual function; of the nausea, ptyalism, and disordered digestion, perversion of the desires and appetite, when they are not results of a morbid suppression of the catamenial discharge. As to the odour given out by the skin; as to the perspiration, the increased temperature, the condition of the pulse, the urine, the colour of the nipple and its areola, the size of the neck, the changes in the aspect of the face, &c., their existence is too variable, too fugacious, or depends upon too many different causes, or they are of too difficult determination, to permit us to repose the least confidence in them. They are merely so many

he made observations upon ninety-four cases of pregnant women, and the result was that twenty out of every twenty-one cases exhibited, upon the surface of their urine, the *kiesteine pellicle*.—It is, therefore, not an *unerring* test of pregnancy; but more uniformly present than any of the other *sympathetic phenomena*. To collect the *kiesteine*, put the urine of a pregnant female in a glass tumbler, set it in the sun, and on the second or third day, a pellicle will rise to the surface, resembling the fatty scum that is found on the surface of broth after it becomes cold.—After the fourth day, the pellicle begins to break up, and by degrees sinks to the bottom. It is found in the urine as early as the first month of gestation, and is therefore very valuable as a diagnostic sign of pregnancy, because at that early period the others are not much to be relied upon.—H.

resources which the learned and upright physician abandons to the shameless quack, or to the credulous ignorant vulgar who are duped by them. Upon the whole, the rational signs, when united in a certain number, and properly weighed, most commonly suffice to make us believe in the existence of gestation, but never to give us a mathematical certainty of it, to warrant us in affirming to it before a court, even although in addition to these there should be a suspension of the periodical flux.

311. *Menses.* However, in women who have no interest in deceiving us, the last-mentioned phenomenon deserves the greatest attention; it is the most conclusive, and sometimes the only one to be met with; but inasmuch as it is frequently the cause or the effect of a great number of affections of more or less importance, and wholly independent of pregnancy, it is not an easy matter to interpret it correctly. If it happen suddenly, without being preceded by any accident or disease that might account for it, and in a woman who is commonly very regular, it may constitute an almost certain sign of pregnancy, while in the contrary condition, its value, always much lessened, can be determined only by a circumspect and experienced practitioner. I have no occasion to remark that it is of no value where pregnancy occurs before the first eruption of the menses. Further, it is well known, that a woman whose menses have been for some time suppressed, either from disease or merely from the progress of age, may become pregnant; that some women are never regular except when they are pregnant; and that the continuance of the menses after fecundation is found occasionally to be almost epidemic, or at least, much more frequent in some years than in others.

312. *Size of the Belly.* The enlargement of the abdomen in a woman old enough to be fecundated, ordinarily suffices with the public, to make them presume that she is pregnant. It is otherwise with physicians. It is occasioned by so many diseases, that it ought in this respect to be classed in the same category as the suppression of the menses. Nevertheless, its ordinary rate of progress is such as to yield a very important sign, and one which, alone, is, in a good many cases, sufficient to render it certain that there is pregnancy.

313. The belly often tumefies or swells by insensible degrees from the first week after conception has taken place; it afterwards diminishes or is even flattened about the beginning of the second month; whence the common proverb, *à ventre plat, enfant il y a*. It soon afterwards grows again in a regular manner, and never stops until the term of parturition. At first it projects along the median line or lower part of the hypogastrium; while the navel seems to sink beneath its natural level. Until the fourth month, the iliac regions appear to grow hollow instead of projecting in proportion with the hypogastrium. About the end of the third

month, the navel approaches towards the level of the skin, which it soon surpasses, so as in some women to form a protuberance of an inch or two, in the course of the fifth, sixth or seventh month. Upon the whole, the special character of a pregnant women's abdomen is that it grows from below upwards, and remains a long time flattened on its sides, although its middle portion already projects considerably. I shall have further occasion to advert to this point when I point out the means of distinguishing true pregnancy from the affections with which we are liable to confound it.

§ III. SENSIBLE SIGNS.

314. The sensible signs of pregnancy are obtained by means of the touch, or of auscultation, and from the material changes effected in the womb.

315. The *touch*. The introduction of one or two fingers into the vagina, while the other hand is applied to the front of the abdomen, is called, in tokology, the *touch*. Recourse is had to it for the purpose of ascertaining the disease of the vulva, of the vagina, the womb, the bladder, the rectum, and all the organs contained within the pelvic cavity; to learn the good or bad conformation of the pelvis, the nature, species, and degree of its contraction; but especially for appreciating the modifications of the cervix uteri, either in regard to its size, its consistence, position, length or temperature; and the weight, form, extent, situation, and dimensions of the womb itself during the course of pregnancy.

316. The touch has always been looked upon as the compass of the accoucheur, but this has not hindered some persons, Puzos among others (122), from vigorously objecting to its employment. Roussel says that "accoucheurs ought to expunge from their books the impertinent directions that they give concerning the touch." According to him the operation is too alarming to the modesty of a respectable woman, too contrary to good morals, and gives signs too vague for it ever to be had recourse to. But Roussel speaks here more like a rhetorician than a physician; his arguments, drawn from its abuse, have no bearing on the rule. Though, in many cases, the touch is insufficient, until two or three months have elapsed after conception, to convince us either that pregnancy does or does not exist, it is, nevertheless, the surest means of exploration in our power. It not only serves to determine whether gestation exists, but it further indicates the degree, the kind; it alone can teach us whether labour is near at hand or begun, whether it is in an advanced stage, whether the child presents aright, whether the assistance of art is useless or necessary, whether every thing is right after labour, &c. The touch, then, is the principal lever, or at least one of the most powerful resources of tokologic science. But, in order to practise it with success, to avoid the gross mistakes that it may cause us to commit, to derive from it every pos-

sible advantage, it is necessary to practise it for a long time, inasmuch as practice alone can make us skilful in such an operation.

317. *Position of the woman.* When the woman is affected with ascites, hydrothorax, asthma, organic disease of the heart or great vessels, when her breathing is difficult, she should stand up during the operation of the touch, so as to avoid the fatigue and even danger that might be incurred by placing her in a horizontal posture. If on the other hand she is weak, threatened with syncope, hemorrhage, or convulsions; if the womb is strongly inclined forwards, or if from any other cause the neck is thrown very far backwards, it is better for her to lie down. Finally, if any difficulty be experienced, she should be examined in both positions, alternately.

318. The muscles must first be placed in a state of relaxation. If the woman is lying down, she should be told to bend her legs and thighs, as well as her head and breast, which are to be gently raised with pillows or bolsters. In the contrary case, she is to be placed against a wall, a piece of furniture or any solid body for her support; she then separates and slightly bends her lower limbs while she at the same time inclines her head and breast a little forwards. To prevent the awkwardness of such a posture, she may be permitted to rest her elbows or hands upon the arms of some other person, or simply upon the edge of a table, or on a couple of chairs placed expressly for that purpose on each side of her.

319. Before we begin the operation, the finger should be covered with mucilage of flaxseed, or marshmallow root, olive or almond oil; butter, hog's lard, cerate, white of eggs, or any kind of grease. Mucilage is the best; but when it is not at hand, it little matters what substance we have recourse to, provided it be unctuous and not irritating.

320. There are two reasons for making use of grease in this way; it would not be so easy without this precaution to penetrate into the vagina; the labia, and the hairs that cover them, might be pulled, and thus be to some women very painful; if the accoucheur should happen to have any excoriation upon his finger, he would by this means be less exposed to contract syphilis, the itch, or other contagious disease with which the woman might be affected.

We should learn to touch as readily with the left hand as with the right.

321. Supposing that two fingers can appreciate the physical characters of a body better than one, Stein recommends the introduction of the fore and middle finger together: some of that writer's countrymen have followed his advice; but with the exception of a few very rare cases, it is never conformed to in France. The sensation felt, instead of being clearer with two

fingers, is on the contrary more confused, and the index, when employed singly, very certainly penetrates much farther than if the medius is introduced along with it.

322. In the first place, in order to introduce it, it should be held straight and strongly abducted from the other finger; or these latter are flexed so that the thumb is placed in the palm of the hand. In common, either of these two methods may be employed indifferently, but the former does not suit for women whose external organs of generation are swelled, sensitive, inflamed or painful; the latter is applicable to all cases, and, consequently, I think it preferable, but that does not prevent me from using the other mode sometimes.

323. It is never indispensably necessary to uncover the woman; if she be lying down, the accoucheur should place himself beside her bed, and the hand being put under the bed-clothes, is carried up to the vulva, passing beneath the ham corresponding to the hand that is employed; if she is standing up, one knee should be put to the floor; according to some it should be the one that corresponds to the hand that is made use of, according to others it should be the opposite one. The former allege the advantage of having a place to rest the elbow on, and of thus obtaining more firmness and surety in the requisite motions. For my part, I think we can touch very well in either way; however, I have for a long time past adopted the latter mode, both in my own practice, and in my instructions; I find that the arm is freer, that it may be more easily inclined forwards or backwards, raised or depressed; that it accommodates itself better to the necessarily varying stature of women, to the different degrees of pregnancy, and height of the womb. After all, it is rather a matter of choice than of necessity.

324. The index finger arranged as before said, with its radial edge turned towards the arch of the pubis, is first directed on to the perineum, or posterior part of the vulva; the point of the finger is then drawn along forwards so as to pass in between the labia, and penetrate into the vagina in the axis of the perineal strait, that is to say, from below upwards, and from before backwards, as if it were intended to reach the sacro-vertebral angle. Previously to searching for the neck, it is proper to explore the state of the rectum, of the bas-fond of the bladder, of the longitudinal columns of the vagina, and the conformation of the straits and excavation of the pelvis: after this first stage, the *os tinæ* is to be examined; the thickness and length of its lips, whether relative or absolute, should be ascertained, as well as their bumps or tubercles, their depressions or slits, their regularity or unevenness, and the form and direction of the orifice; we should next endeavour to determine the length of the neck as well as the size of the womb, which must be raised up so as to learn its weight, while its dimen-

sions also may be ascertained, if, while the finger touches it in the vagina, we can also succeed in feeling and pressing upon its fundus through the abdominal parietes with the other hand.

325. With these precautions, it is often possible, after the end of the third month, in a lean woman whose abdomen is pretty flaccid, to take hold of the womb by its neck and fundus at the same time ; to make it incline backwards, or to either side ; to judge of its mobility, form and size ; to measure very exactly its length and weight ; to become certain whether or not it is in a natural state, and whether or not the substance it contains is fluid.

326. The depression of the cervix, its gentle inclination forwards or backwards, its density, its length and volume, whether a little more or less considerable, exhibit varieties too multiplied, and may depend upon causes too diverse for us to place much reliance upon them. Besides, to judge of them, we should have touched the same woman once or oftener, before she was suspected of being pregnant, and every one knows that this is a condition rarely met with. Alphonse Le Roy, in asserting with the decided tone that characterized him, that augmented heat of the cervix was sufficient ground for him to affirm that pregnancy had taken place, has only given an additional proof of his arrogance and temerity. If conception does increase the calorification of that part, indeed, do not all the irritative affections produce the same result ? Is not the heat of the cervix various in different women, and even in the same woman at every moment of the day, of the week, or month, or year ? Must it not present innumerable shades, according to the heat peculiar to each practitioner's finger, and also according to the necessarily varying temperature of the same practitioner's hand.

327. Hippocrates and the ancient physiologists taught that the vaginal orifice of the womb closes immediately after fecundation, so as to prevent the escape of the semen ; Mauriceau and other accoucheurs have remarked, further, that the cervix becomes sharper than it was in the course of the two months preceding fecundation ; that it assumes the form of a cone with its base turned upwards. These changes, it is true, take place in some women, but they so often fail in those who have never borne children, and are so fugacious, so difficult in common to recognize, so slightly marked after a first pregnancy, that it is almost impossible to derive any advantage from them.

328. Stein affirms that in the first two months, the posterior lip, naturally the shortest, becomes the longest, and at length reaches the same level with the anterior one ; that the slit in the *os tincae* is transformed into an opening more or less regularly rounded and circular ; that the pubic face of the lower segment of the womb gives birth to a soft and more or less projecting tumour ; and that these changes most commonly suffice to prove that the woman is with

child. But it is so common to meet with a circular form of the lower orifice of the womb in women who are not pregnant and who have borne several children, and even in young virgins to see the posterior lip as long or even longer than the other, either absolutely or only in appearance, that the assertions of Stein do not really deserve a serious refutation.

329. I cannot, however, refrain from mentioning a peculiarity which perhaps imposed itself upon him as that anterior projection which is vaguely treated of in the French translation of his work. It has happened to me several times, and I have pointed it out to a number of my pupils, to find, in women who had been already touched by a good many persons, that the anterior lip was sensibly longer and softer than at the commencement of our practical sittings; examining this lip with care, it was then easy to feel a real crepitation, and to find that it was swelled, and fungus-like; but this was a state wholly foreign to gestation, and which was produced solely by the frequently repeated touchings to which we had subjected the woman. At other times, we feel above the vagina, immediately in front of the anterior lip, a softer, larger, more regular and less elastic tumour which does not crepitate; but this projection, which I have met with at every stage of pregnancy, evidently depends upon the bladder, the *bas-fond* of which presses the corresponding wall of the vagina more or less downwards; I should not dare to affirm, moreover, that it does not pretty frequently exist independently of the state of gestation.

330. Thus, until the second or third month, the sensible signs, the touch itself, cannot, any more than the rational signs, give us a mathematical certainty of the existence or non-existence of gestation. They sometimes permit us to establish a diagnosis that is more or less probable, but never certain; so that during this period, the touch is in fact but a feeble resource, and women should not, without strong motives, be subjected to it.

At a later period, although the practitioner cannot affirm positively that there is a *fœtus* in the womb, he can at least be sure that the organ is considerably increased in size. Thenceforth all that is necessary is to distinguish real gestation from the diseases that are sometimes confounded with it. Soon afterwards we are able to perform the *ballotement*, and to perceive the spontaneous movements of the child, which are the only phenomena that prove beyond question the existence of pregnancy.

331. *Ballotement*. In effecting what is called *ballotement*, after having first placed the index finger under the cervix, the summit of the other hand is to be applied over the fundus of the womb, by pressing it against the belly, which is to be carefully depressed so as to push away the bowels and fat. In this way the womb is held in the most exact manner possible, by the two extremes of its longitudinal diameter, and now the womb is to be

suddenly pushed upwards with the finger that is in the vagina, while the hand on the hypogastrium attends to and judges of the motion experienced by the ovum. The fœtus, which is movable, free, and the only solid substance within the amniotic fluid, strikes directly opposite to the point that received the impulse. If the hand that is outside receives no shock, the motion is to be sent back to the other one in the vagina. Should the first attempt fail, it is repeated several times, communicating the impulse with each hand alternately, and taking all proper precautions not to give the woman any pain. The same thing happens here that is seen in physics when experiments are made on the transmission of motion. Indeed, let a vessel full of water be struck on any part of its circumference, and the little figures that have been suspended in it by means of glass bubbles or small bits of cork, will immediately move to the opposite side. But it is easy to understand that, in order to obtain this result, the fœtus must have attained to a certain size, that there must be a sufficient quantity of liquor amnii, that the uterus and parietes of the abdomen must not be too thick, and that the operation must be done with a dexterity and skill that can only be acquired by practice on the natural subject.

332. Whenever a solid and movable body has struck one or both hands during the operation for *ballotement*, there can be no further doubt as to the woman's being pregnant; but care should be taken not to be imposed upon by the jar of a fluid, or any other kind of motion. It is only from the fourth to the sixth month that the *ballotement* presents a resource of any importance; for it is rarely that the jar of the fœtus can be perceived before the end of the third; and in the next three months of gestation it is in general too easy to determine the state of the woman to make such a recourse needful.

333. *Motions of the child.* *Ballotement* impresses on the ovum only a passive motion, which is the same whether the fœtus is dead or alive, and which would be the same were it possible for a polypus or any other solid and large body to be free and movable in a uterus filled with any kind of fluid. *Ballotement* makes us know that pregnancy exists; but active or spontaneous motions alone give us the certainty that the fœtus is living.

334. The child does not move in an active manner until after its muscular system has acquired a certain degree of development; and still its motions must be so weak, that the woman can hardly perceive them until in the course of the fourth month. At the beginning she has a feeling of *formication*; after which they acquire a force that varies according to the vigour of the child, the stage of pregnancy and the good or bad health of the mother. Their strength most commonly increases until the birth; sometimes they increase for one or two months, become less marked in the sixth and seventh, and resume their activity towards the end of preg-

nancy. M. Désormeaux has seen them cease entirely from the end of the fifth month, and the child nevertheless be born strong and healthy at full term ; in other instances they are never perceived at all : some able practitioners, such as Mauriceau, De La Motte, Baudelocque, &c., mention women in whom attempts had in vain been made to excite them, and who were nevertheless delivered of robust and well-grown children. It may be supposed that plethora, some constraint, some difficulty in the circulation of the fluids of the ovum, or even those of the woman herself, may render them duller, slower, more obscure and vague ; and that the free exercise of all the functions, cheerfulness and contentment of the mother, and a proper degree of strength on the part of the child, give them more energy and vivacity. Delicate, nervous and irritable women feel them sooner and plainer than those whose sensibility is less exquisite, who are not in the habit of carefully analyzing their sensations, and who, in consequence of their temperament or disposition being naturally more quiet, possess a calmer imagination and less impressible organs : the former sometimes assert that they have felt the child move at the end of the third month, (which seems almost impossible, since the muscles are still mostly gelatinous,) while the latter do not commonly speak of it until towards the end of the fourth.

If the motions of the child are very decided, quick, and frequent, it is not necessary for them to move the abdominal parietes in an evident manner, as is sometimes seen, to guard the woman against confounding them in any way with motions of another kind ; but when they are weak and return but rarely, nothing is more common than for other sensations wholly independent of them to be mistaken for them ; so that the prudent accoucheur should never pronounce upon them without having made himself perfectly sure.

335. For this purpose it often suffices to apply the hand, which must be cold and naked, to the abdomen ; it may be previously rubbed with brandy, Cologne water, &c., or dipped in cold water, with vinegar and ammoniac in it. This application produces a sudden transition in the temperature of the hypogastrium, which re-acts upon the child and causes it to move in a convulsive manner. If this simple means does not succeed, the palm of the hand is to be placed on one side of the abdomen, which should then be properly struck with the other, as in examining into the existence of ascites. The fœtus thus disturbed scarcely ever fails to move with some force : and this is a sort of *ballotement*, which possesses the advantage over the common method of not requiring the finger to be introduced into the sexual organs, but which has also the disadvantage that it cannot be usefully employed until after the fifth month.

Auscultation. After having properly performed the touch, having attempted to effect the *ballotement*, and to feel the motions,

whether active or passive, of the fœtus in vain, we have no method of solving the problem left except auscultation.

336. After Laennec had shown that it is possible to see with the ear what is passing inside of the chest, it was natural to suppose that auscultation would soon be applied to the investigation of the diseases or functional changes of other parts of the body. MM. Major and Fodéré had already given some hints on the subject when Mr. Kergaradec, in an interesting memoir, maintained, that gestation may be ascertained with great certainty by means of the stethoscope. According to that physician, two kinds of sounds may be heard in the womb of a pregnant woman: one, which although quicker and shorter, is analogous to that of a feeble respiration, is the *bruit de souffle*, which he has denominated the *placental sound*; the other, similar to the ticking of a watch wrapped up in cloths, depends on the beating of the heart, and may be called the *sound of the heart*. The former is isochronous with the pulsations of the mother, which hinders it from being confounded with the respiratory sounds; but it is in almost every respect similar to that caused by muscular contractions, that heard in the large arterial trunks when spasmodically contracted or compressed by some external tumour, and in the heart itself in certain pathological states at present not well understood; so that some well performed experiments are still necessary in order to demonstrate that it appertains to pregnancy rather than to some other condition of the female. M. Kergaradec thought that it corresponded to the place where the placenta is attached, and was produced by the passage of blood from the womb to the vessels of the ovum, or in other words by the uterine or placental circulation; but although some facts seem to support this explanation, there are many others opposed to it, and my own observations lead me to regard them as but very improbable conjectures. In the majority of cases, it requires a very practised ear to perceive them at all, and this is doubtless the reason which has induced many physicians to reject them altogether.

337. I have myself in vain sought for it in a great many subjects; on the other hand I have distinctly heard it in a great many others. It was sufficiently strong in three women who were confined at the *Hospital de Perfectionnement*, and in two others who were made use of for the practical demonstrations of my course, for the least skilful medical students and female students in midwifery to hear it very plainly. I have never met with it except in the second half of pregnancy. If Laennec and M. De Lens, who say that they have heard it before the end of the third month, were not mistaken, that alone appears to me to be reason enough why it is impossible to attribute it to the placento-uterine circulation.

338. It should be sought for between the anterior edge of the

pelvis and the navel, and lower down in proportion as the pregnancy is less advanced.

339. The double beat, or sound of the heart, cannot be confounded with any other; for the pulsations can be counted to the number of a hundred to a hundred and forty or a hundred and fifty per minute, while the mother's pulse beats only from sixty to seventy-five in the same space of time: growing stronger as the *fœtus* grows older, this sound can scarcely be appreciable before the fourth month; of a necessarily variable intensity, on account of a great many circumstances that are difficult to characterize, it is never heard better than when the child's back corresponds to some part of the anterior surface of the uterus; I have scarcely ever failed to detect it when able to seek for it with all suitable care; the anterior curve of the *fœtus*, and the relations of the heart to the spine, are the reasons why the back is the only part that is evidently capable of transmitting the double beat to the ear of the observer. From this remark it may be conceived that they may change their place if the *fœtus* changes its position, and that before affirming that they do not exist at all, we should have by turns explored the hypogastrium and the loins, the flanks, and all the various parts of the circumference of the pelvis.

340. In order to perform the auscultation, the woman must be lying down, although in fact she might be allowed to stand up; if the pregnancy be somewhat advanced, the ear will suffice, and sometimes succeeds better than the stethoscope with persons not in the habit of using that instrument. However, it can only be conveniently applied on the anterior half of the abdomen. Moreover, the friction of the gown or any other part of the woman's dress, whom it is unnecessary to uncover during the operation, may frequently deceive us as to the nature of the sounds we hear. The stethoscope in general yields a clearer or more intense sound; besides, it can be applied at all stages of pregnancy, and to all the points to which the *fœtus* seems able to turn its back; the end piece is to be taken off; then after having felt for the womb, it is placed first on the left, then on the right, and next on the middle of the hypogastrium; it is even applied to the loins, the posterior face of the sacrum, the *cristæ* of the *ilia*, the front of the pubis, &c.

341. Were it always possible, the child's back, the corresponding parietes of the womb and abdomen, the stethoscope and the ear of the accoucheur should not be separated by any void space and by no other part, and they should constitute as it were a continuous body, without any interruption whatever.

342. The sound of the heart is a certain sign both of pregnancy and of the child's being alive; its strength, in general, indicates the vigour and good health of the child; during labour, when accidents occur, or when a serious operation appears to be indispensable, its simultaneous existence at two opposite sides of the

abdomen will render it certain that the womb contains two children; if met with in a woman whose uterus is but little developed, no doubt remains of there being an *extra-uterine* pregnancy; but its absence, like that of the active or passive motions of the fœtus, does not afford a conclusive proof that there is no gestation, or that the child is not living.

343. As to the *bruit de souffle*, its nature is still too little understood to enable a circumspect practitioner, at present to pronounce from its single testimony that such or such a woman is or is not pregnant.

343. *To determine the stage of pregnancy.* After having by means of the simple touch, of *ballotement*, of muscular movements, or of auscultation, ascertained that there is pregnancy, it is still further useful, sometimes, to determine its stage; on this subject I shall not repeat what has already been said concerning the changes effected every month in this state of the cervix, the body and fundus of the womb; I shall content myself with remarking that, in order to obtain a just idea of these changes, especially those of the neck, it is often needful to *touch* in a different manner from that in which it is commonly done. In the first place we are not to understand by the *neck* that portion merely of the womb that projects into the vagina, but rather all the cylindrical portion of the summit of the uterine ovoid, a kind of appendix which cannot be completely felt except by pushing back the vaginal cul-de-sac with the finger, in the centre of which is felt the os tinæ; in the second place, in women who have had children, we should make an allowance for the thickness of its lips; lastly, when the uterus is oblique in front, and the pelvis not very large, the orifice may be so high up, that in order to reach it, the radial side of the finger must be turned backwards, or the perineum somewhat depressed, while with the other hand applied upon the epigastrium, the fundus of the womb is thrust backwards towards the vertebral column. In other cases, particularly where the superior strait is very ample, the neck looks directly towards the anterior surface of the sacrum; to touch here, we are obliged to carry the finger almost horizontally backwards, and then to bend it forwards in the shape of a hook; in other women we meet in the superior half of the excavation, a round tumour, in the posterior part of which the neck appears to be obliquely hollowed out like the ureters in the parietes of the bladder: with all these precautions, a skilful accoucheur can say, what is, within from fifteen to thirty days, the period of pregnancy; but it would be dangerous to forget that there are numberless causes of error, and that we should never, before a court, give a decisive opinion until we have previously acquired a mathematical certainty of the fact concerning which we have to pronounce.

344. *Compound pregnancy.* It was natural to suppose that the

uterus would be larger when containing two or more children, than when it encloses only a single one. Hence also almost all those appearances that depend upon the pressure and displacement of the soft parts both of the pelvis and abdomen, have been enumerated among the symptoms of compound pregnancy. But all that has been said on this subject throws but a vague light upon the question; varices, infiltration, œdema, swellings, difficulty in moving the lower limbs, engorgement of the labia pudendi, dyspepsia, difficulty in making water, in walking, breathing, digesting; an elliptical or flattened shape of the bag of waters; weakness of the uterine contractions; lypothymia and syncope; the belly being larger, rounder, rather depressed than salient along its median line; motions of the fœtus felt with more force and frequency, and on both sides of the abdomen at once, &c., all fail, too frequently in twin pregnancies, for us to place much confidence in them; besides, all these signs are rarely met with together, and a majority of them may be met with where there is only a single fœtus in the womb; which, further, may be easily imagined to be the case, inasmuch as the size of the gestative organ may be much larger in some cases of simple pregnancy than in others where the gestation is evidently double or triple.

345. Baudelocque teaches that the touch is able to conduct us to more satisfactory results. He says, for example, that where the belly is very large, if there be only one fœtus, the ballottement will be very easy; while, if there be two of them, there will, on the contrary, be some difficulty in effecting it, and that their motions or their most projecting portions can be distinctly felt through the parietes of the abdomen, in several places at the same time. It may be added that we ought to be able, by means of auscultation, to hear the sound of the heart at two places, at some distance from each other, and that if the pulsations denominated *placental* are of any use in obstetrics, they will also be heard at two distinct points.

346. The union of these signs would give us, without the least doubt, a certainty of the woman's being pregnant with two or more children; but the want of them is far from always constituting a negative sign of compound pregnancy. M. Désormeaux cites a case wherein the most manifest ballottement coincided with a very great size of the abdomen, and in which that able accoucheur could only detect a single fœtus, while the ovum in fact contained two. On the other hand, the ear cannot detect the cardiac pulsations of two fœtuses, when they are so situated that one is above or in front of the other, so that it is most commonly impossible, previously to delivery, to affirm whether the pregnancy is simple or double.

SECTION 2.

Of Extra-uterine Pregnancy.

§ I. OF OVARIAN PREGNANCY.

347. Andry, and the animalculists, who, like him, supposed that the living corpuscles of the seed passed along the Fallopian tubes in order to join the ovule in the female seminal gland, did not attempt to contest the existence of ovarian pregnancy, and among modern practitioners there are few who think of calling it in question; Boerhaave even thought he could divide it into external and internal, but this question appears to me to have been too lightly judged, and to deserve a new examination.

348. In whatsoever manner, indeed, fecundation is really effected, whether by means of an *aura*, an animalcule, or by any other principle of the semen, it must happen that the germs of the two sexes shall come in contact with each other; this contact cannot take place without a rupture of the covering of the ovary, and of the capsule of the ovule; so that by the simple admission that an ovule is vivified, it can no longer be said to be enclosed in the ovary, unless we believe with Chaussier, that the male germ reaches that of the female by means of absorption. A great many cases of ovarian pregnancy are to be found in the various *scientific collections*: an infinity of physicians and accoucheurs of merit have stated that they have met with them in practice; but it is easy, upon a moment's reflection, to perceive that not one of the cases hitherto published, not even those of Littre and Smith, prove undeniably that ovarian pregnancy has ever been seen. It is so easy in the dead body to confound this kind with abdominal pregnancy, those who have treated of them have given so few details, pathological anatomy was at that period so little cultivated, that no result can in fact be obtained from the observations of the authors; and while the moderns shall not have demonstrated, with the scalpel, that the ovum is sometimes really situated in the ovary and not in the adjacent parts, reason dictates to us that we should not admit the existence of ovarian pregnancy.

349. I have learned at my own expense how easy it is to be imposed upon in this matter. In 1824 and 1825 I met with the remains of extra-uterine conceptions in four different subjects; I removed the sexual parts with great care, and thought I was in possession of four facts in proof of the existence of ovarian gestation. I presented them to the *Société Philomathique*, where several members expressed doubts as to the possibility of the fact. MM. Blainville and Serres were good enough to assist at the dissection, which I performed the next day. We satisfied ourselves that three of these tumours were outside of the germiferous gland; we

experienced greater difficulty in regard to the fourth, which did not exceed an inch in size; but at length, after having completely isolated the Fallopian tube, we found that the *debris* of the conception was contained in a special sac between the peritoneal coat and the proper covering of the ovary which was wholly distinct from it. Certainly, none of the facts that have been cited as proofs of the existence of ovarian pregnancy have been more carefully examined; and certes, if it had not been for the objections and the presence of an able defender of the opposite opinion, we should have remained convinced that the seat of the tumour was in the very parenchyma of the ovary.

§ II. ABDOMINAL PREGNANCY (*peritoneal, ventose, external, &c.*).

350. Admitting that fecundation is effected in the ovary, it is very natural that the vivified ovule should sometimes fall into the belly instead of being engaged in the Fallopian tube; in reflecting upon the anatomical arrangement of the parts, one is disposed to believe that such accidents are not uncommon; if, says Bianchi, it does not occur more frequently, it is doubtless because a very great majority of the germs that escape in this way die before they become attached to the serous membrane that receives them. However, some modern accoucheurs have asserted that it could not occur; that the peritoneum is not sufficiently vascular to supply to the germ the requisite means of development; that in the instances in which dissection had shown the fœtus and its secundines to be in the abdomen, there had been previously a tubal or uterine pregnancy. It is true that the tube and the ovary are commonly, and sometimes a part of the uterus itself is, lost as it were in the mass of the tumour, and that it would be imprudent in that case to affirm that the ovum was not originally located in another place; but it is at the same time an incontrovertible fact that in many of the published cases, both the ovary and the tube retained their natural condition, and were completely foreign to the sac which contained the fœtus. On the other hand the veterinary physicians, more competent even than accoucheurs to solve this problem, have completely embraced the affirmative, relying on numerous and authentic facts that have been noted for thirty years past; besides, the difference between the structure of the peritoneum and that of the womb cannot in fact serve as a basis for any good argument; the ovum, which may be compared to the bud of a plant endowed with life that is still very obscure, is so constituted as to unite with the first living parts whereon nature places it. The interior of the womb or of the tube doubtless suits it better; but are we allowed on that account to say that it can never take root in any other situation? Therefore nothing in the laws of the organism forbids us to admit the possibility of a peritoneal

pregnancy, and I should not have taken the trouble to combat the opposite opinion, were it not that M. Dubois still maintains it, and throws around it all the weight of his imposing authority.

351. The fecundated vesicle, soon covered with a velvety pile similar to the spongioles of the roots of plants, must rapidly contract adhesions with the surfaces on which it rests; there is an afflux of fluids to that point, appearances similar to those of a local and very circumscribed inflammation soon occur, and an accidental sac is soon organized around the little ovum, which is, so to speak, thenceforth protected against the action of the surrounding organs.

§ III. OF TUBAL PREGNANCY.

352. Tubal pregnancy, more common than any of the others, and the only one that has not been contested by the partisans of ovarian fecundation, could only be rejected by authors who believe that vivification takes place in the womb; but the cases on record are now so numerous that it is no longer permissible to entertain the slightest doubt in relation to it. Without mentioning those that are detailed in the works of Bartholin, of Riolan, of Bianchi and others; in the dissertations of MM. Bry, De Bouillon, Bonis; of those related in the *Revue Médicale* (1826), the *Nuovo Giorn. dei Lett. Ital.* (1825), of another reported by M. Vallerand, *Nouv. Bibl. Med.* (1826), and of an infinitude of others that have been published in the *French and Foreign Scientific Collections*, I will state that in 1816 I saw in the body of a woman who died at the hospital at Tours, a very perfect ovum in the second month of its growth, which was very completely enclosed in the outer half of the Fallopian tube, of which the root, the fimbriated extremity, the canal and all the other parts were still easy to be recognized. Any one may see, in the Museum of the *Ecole de Médecine*, a wax model which mathematically demonstrates the same thing. We may conceive, further, that in this species of pregnancy, the product of fecundation may attach itself to any portion of the length of the tube, but that it will most frequently stop in the trumpet part of it, and that after a certain lapse of time, it must be difficult to decide, at a glance, whether the pregnancy is tubal, rather than abdominal or ovarian. It may besides be conceived, that the uterine duct, soon distended, and thinned, might burst, and transform a tubal into a peritoneal pregnancy; so that the latter may, in fact, be either primitive or essential, or else secondary, or accidental; but it is superfluous, with Boëhmer, to describe both an internal and an external tubal pregnancy.

§ IV. OF INTERSTITIAL PREGNANCY.

353. The ancients made no mention of what M. Mayer has proposed to denominate interstitial pregnancy. Noticed by Schmidt,

Albers, Hederich, Carus, MM. Clét, Bellemain and Lartet, Dance and Moulin, it had been studied with some care by MM. Mayer and Meckel in Germany: but scarcely any thing had been said on the subject when M. Breschet, to whom MM. Bellemain and Lartet had abandoned the specimen which had served as the basis of their observation, undertook to collect all the known facts in relation to the topic.

The ovum in this case does not lodge betwixt the peritoneum or the mucous coat and the proper tissue of the womb; but in the very substance of the fleshy structure. In five out of seven cases, it has been found on the left side, above, behind, before, or below the tube, which did not in any case, as we are assured, communicate with the cavity that contained the production. It is at least certain, that in the one I had an opportunity of examining along with M. Breschet, there was no communication between the natural cavity of the genital organs and the preternatural sac which contained the fœtus. M. Ménière has published in the *Archives Générales de Médecine* some very judicious reflections on interstitial pregnancy; but the case he had in connection with M. Dujardin does not appear to me to belong to that class. Dionis, Canestrini, Einsenman and Ramsbotham, have each related a case which seems to be more like it.

Attempts have hitherto been vainly made to explain the mechanism of this kind of pregnancy; M. Breschet has supposed that when the ovule is about to enter the uterus, it might upon meeting with some obstacle, engage in the open orifice of some one of the venous sinuses that open at the origin of the Fallopian tubes, and thus gradually insinuate itself into the very substance of the parietes of the womb. But as these orifices have no existence in fact, the explanation falls to the ground of itself. On the other hand, admitting that the angles of the uterus, at birth, being very long, bear a partial resemblance to the horns of the womb or the *ad uterum* of quadrupeds, M. Breschet presumes that the narrow passage which then leads to the seminiferous tube, might, by becoming obliterated, compel the germ to deviate from its ordinary route. But if it be true that such a conformation is sometimes met with, I can at least affirm that it is rarely so, and is not according to the natural order of things. This, therefore, is also but a gratuitous hypothesis. The same must be true of the passage discovered by M. Baudelocque, Jun., in the side of the womb, as well as of the preternatural cavities mentioned by Morgagni, Val-salva, &c. It is true we may have recourse to anatomical varieties, to diseases, anomalies, to deviations of all sorts, and indulge in a thousand suppositions; but the wisest course is to confess, frankly, that the mechanism of interstitial pregnancy is wholly unknown.

§ V. CAUSES OF EXTRA-UTERINE PREGNANCY.

354. The density, the preternatural thickness of the covering of the ovule, or envelopes of the ovary, too strong an adhesion of the germ, its being situated too deep or too near the ligament of the ovary, the obliteration, paralysis, spasm, bad direction, excessive or insufficient length, engorgement, or antiperistaltic motion of the Fallopian tube, inflammation and ulceration of its mucous membrane, induration of its trumpet end, or of one or more of its fringes, the contraction of its external orifice, all the changes and anomalies that this canal may exhibit, whether in regard to its conformation or its situation, a laceration of the womb, spoken of by Boëhmer, Bianchi, and Weinckneicht, may well have produced some instances of extra-uterine pregnancy; but it is certain, that in this respect science is possessed of scarcely any thing beyond probabilities. Astruc believed that unmarried women were more liable to be affected with this sort of accident than others. Kruger, who unites in this opinion, supposes that the ovule remains in the ovary, stops in the tube, or slips into the peritoneum, because fear, alarm, indignation, by attacking women suddenly in the midst of the most lively enjoyment, or shortly afterwards, must occasion a disturbance in the whole organism, whose effects reach even to the sexual organs. A case by M. Lallemand, and another by Baudelocque, seemed to lend some support to the opinion of Astruc; in fact the extra-uterine conception in the two women who were the subjects of it, seem to have been effected, at the very instant of a violent fright, occasioned in one by the remembrance of some piece of forgetfulness, and in the other by a sudden noise, which made her afraid of being caught in *flagrante delicto*; but as nothing similar has been noticed in other cases, this explanation can only be regarded as a tolerably plausible hypothesis.

355. Those who insist that fecundation is effected in the womb, necessarily reject all these modes of viewing it, and can give no account of extra-uterine pregnancy, but by supposing a retrograde movement, by means of which the ovule returns from the uterus into the tube, &c. The assertions of Planchon, who affirms that the tubes are slightly dilated in the first weeks of conception, a remarkably curious case reported by Patune, in which it is said that the umbilical cord of a fœtus enclosed in the fimbriated extremity was inserted into a globose placenta, situated in the very cavity of the womb, are very rare facts, and ought to be met with anew before they can give much weight to such conjectures.

§ VI. SIGNS AND TERMINATIONS OF PRETERNATURAL PREGNANCY.

356. The continuance of the menses, severe pains in the hypogastrium, nausea, and frequent vomiting, as well as several other

distressing symptoms, considered as signs of extra-uterine pregnancy, sometimes, indeed, do accompany it; but as they also are oftener wanting, and not at all uncommon in natural pregnancy, their presence is, on that account alone, of very little weight. Though the breasts undergo no change, secrete no milky fluid; though the belly is uneven, its growth more rapid, and its development chiefly on one side; though the motions of the fœtus are earlier felt, and through surfaces apparently very thin; though the womb remains quite small, in some cases of extra-uterine pregnancy, the contrary happens in a still greater number of cases, and one or more of these irregularities is frequently met with even in simple pregnancy.

However, though it is true that the womb sometimes increases in size in such cases, it is equally true that the changes which it then experiences are seldom sufficiently marked to make us believe in the existence of a natural pregnancy of four or five months' standing. If, therefore, the abdominal tumour has risen early above the marginal strait, and is found in one of the iliac fossæ; if it appears to be full of bumps, varicose, and if pulsations can be felt in it; if it be easy to feel the protuberances and motions of the fœtus, while the parietes of the abdomen preserve nearly their natural thickness, and, on the other hand, we can ascertain by the touch that the weight and size of the womb are not at all, or but slightly increased; that the cervix has not in any sensible degree diminished in length, although it has altered in respect to its position, direction, density, and even form, then it is evident that the pregnancy is preternatural.

357. Still it may be conceived, that although the ovum has fixed itself in some part of the pelvis, or to some point on the periphery of the womb; or has been arrested very near the root of one of the tubes, or even in the substance of the parietes of the uterus, all these signs may in fact not exist, and the preternatural pregnancy be confounded with an ordinary gestation. In these cases the uterus swells, softens, undergoes a major part of the changes that characterize real pregnancy, its cavity becomes filled with a con-crescible matter which is amorphous, a kind of *membrana caduca* or *anhistous layer*, observed by Bertrandi, Chaussier and others; the form of the belly and the motions of the fœtus exhibit nothing peculiar, and ballottement itself is not always impossible.

358. In general, the sexual organs depart but very little from their natural state, when the fœtal cyst is not within the tube, and contracts no adhesions with the womb. On this subject, the case noticed by M. de Bouillon should be regarded only as an uncommon exception. In these cases the cervix rarely becomes much shortened, nor does its orifice dilate in any considerable degree; it is found to be much lower or higher, more forward or back-

ward, or to one side, than the presumed period of the pregnancy would seem to indicate.

359. After all, neither the rational nor sensible signs suffice, until the end of the third month, to prove that pregnancy is extra-uterine. After this period, it will in most cases be possible, by means of some or all of them, to establish an almost certain diagnosis; the evidence derived from them will at least give rise to suspicions sufficiently strong to fix the attention of the practitioner.

360. As to the distinctive signs of the different species of *extra-uterine* pregnancy, I do not think it would be useful to treat of them in this place; the knowledge of them could not be beneficially applied; besides, all those that have been mentioned are too uncertain to deserve the least confidence: since, even on the dead body, we can scarcely decide, even by means of the scalpel, whether the ovum is situated in the tube, the ovary, or the peritoneum, it would be in some measure ridiculous to desire to obtain any certainty in relation thereto, on the living subject.

361. Extra-uterine pregnancy commonly terminates before the fifth month; Baudelocque, MM. Arnault, Novara, Delisle, and some others have nevertheless seen it much more prolonged, and even to the term of ordinary gestation. These authors, especially the former, mention a very remarkable circumstance; it is that in these cases, at the close of a kind of labour, attended with intermittent pains, that are sometimes pretty strong, a commencement of dilatation of the neck, a discharge of mucus, of a bloody fluid, and what seems still more surprising, very regular contractions of the womb or of the fœtal cyst are observed to take place. In fact we may conceive of a part of these phenomena in tubal pregnancy; the tube being composed of the same elements as the womb, it is quite natural for it to enjoy the same properties; but, in abdominal pregnancy, we can only account for the contraction of the cyst by supposing that there has been a development of fleshy fibres in its parietes, at the cost of the elastic cellular layer which is enclosed in the peritoneum of the pelvis.

362. *Termination.* Interstitial pregnancy alone admits of a possibility of extracting the fœtus by the natural passages; the calibre of the tube, and its slight dilatability, do not allow us even to think of it in the other species; in this view, therefore, extra-uterine pregnancy is always dangerous, both for the mother and child: its natural terminations are the death of the fœtus, and rupture of the cyst.

363. *Death of the fœtus.* It is rare for the fœtus to continue alive beyond the second or third month; after its death, which happens for want of nutrition, or in consequence of inflammation of its envelops, it sometimes happens that the liquor amnii, as well as all the other fluid portions of the ovum, are absorbed, the child

hardens, petrifies, or is transformed into *gras de cadavre*, the cyst contracts, thickens, and becomes fibrous, fibro-cartilaginous, or even osseous, and the whole resolves itself into a solid tumour, which may remain in the abdomen for an indefinite period, without compromising the life of the woman. In other cases the sac is transformed into a real suppurating cavity, the fœtus is decomposed, dissolved, or putrefies, and then the cyst soon contracts adhesions with the surrounding parts, so as speedily to open into the bladder, the cæcum, the colon, the small intestines, the rectum, or directly outwards through the parietes of the belly or perineum, if not immediately into the peritoneum. Sometimes the ovum becomes merely filled with a fluid which is more or less thick and transparent, of a yellow, brown, gray, or reddish colour, but not purulent; or it is converted into a cyst, in which as much as one hundred and fifty pounds of fluid have been found, and containing the debris of a fœtus: an instance of which is reported by Vassal.

The first case is the most fortunate of all; with it should be classed most of those pretended pregnancies that have been said to last two, four, ten, fifteen, twenty, thirty, and even forty years: the second is always accompanied or followed by serious symptoms; inflammation is propagated to the circumjacent parts, gives rise to violent fever, and sooner or later brings on a fatal termination; the patient most commonly becomes hectic, for she is exhausted by an abundant suppuration; sometimes, also, all the parts of the fœtus escape one after another; the sac is gradually emptied, becomes clean, and contracts; the suppuration ceases by degrees, and the wound at last closes, or at least is reduced to the state of a fistulous ulcer, which is rather more troublesome than dangerous.

364. Every species of extra-uterine pregnancy may terminate by the laceration of the ovum, and of the sac which serves in place of a womb; examples of this kind, if we may credit M. Mesnière, have been noticed both in interstitial and abdominal pregnancy; but tubal pregnancy most frequently terminates in this way: although very extensible, the parietes of the tube are, nevertheless, too thin to admit of the enlargement of the cyst beyond the third or fourth month. In some instances the rupture occurs suddenly and seems to be occasioned by some exertion, or fall, &c.; sometimes, on the other hand, it is effected and prepared for by slow degrees, by the mechanical thinning, the softening, or some other change of a portion of the fœtal sac. In all cases where no conservative adhesions have been formed, the water of the amnios, the fœtus, and the blood that flows from the lacerated surfaces, pass into the cavity of the peritoneum; lipothymia, syncope, convulsions incessantly repeated, and intolerable pains, often carry off the sufferer in a few hours; in other instances vital resistance does not so readily yield; a violent peritonitis comes on, and

death succeeds on the second, third, or fourth day. Finally, in some rare cases, nature, with proper assistance, resists the first dangers of this redoubtable tempest, and a protracted inflammation permits the effused matters to accumulate in a more circumscribed space, and give birth to a real abscess, which may still leave some chance for saving the patient.

365. *Treatment.* The impossibility of certainly recognizing the nature of extra-uterine pregnancy in the first months of its existence, is the reason why attempts to remedy it are scarcely ever made until the occurrence of symptoms, announcing the death of the fœtus or rupture of its coverings: besides, the powers of art are so limited in these circumstances, that the only assistance which it is possible to afford would be almost as dangerous, in itself considered, as the natural terminations of the affection. Gastrotomy, the only remedy that has been proposed, can boast of no success as yet; in one case, published by M. De Bouillon, the woman survived eighteen days; nature, on the contrary, when left to her own resource, has several times succeeded in triumphing over all obstacles. Nevertheless, the fears of Levret and Sabattier, in regard to hemorrhage, suppuration, and wounds of the peritoneum, are evidently exaggerated; it would seem, *a priori*, that gastrotomy ought to be much less frequently fatal than is commonly supposed.

366. On the other hand, although we have no right to invoke past experience in its favour, we should not forget that, having been hitherto performed in despair of all other assistance, we have no reason to be surprised at its not having prevented death from taking place. I think, therefore, with M. Désormeaux, that if recourse were had to it early, before the formidable array of inflammatory symptoms have developed themselves, before peritonitis becomes of itself mortal, a considerable number of women might be saved. It has been maintained that in all cases it should not be had recourse to until the seventh month of pregnancy, unless it be certain that the fœtus is dead, and the cyst opened into the peritoneum; that otherwise, we should, without advantage to the mother, sacrifice the life of a child which we might possibly have conducted to its full term, and rescued alive. This reasoning is good for nothing; the chances of success in the operation are so much the more numerous in proportion as the pregnancy is less advanced; in this case there is too little probability of the future life of the fœtus, for it to be balanced against that of the mother. After seven months, when the child is *viable*,* reason and humanity both dictate its performance without hesi-

* I have left this word untranslated: it expresses that state of development in which a child *may* live, when independent of its connection with the mother. I trust the reader will pardon me for introducing it here, especially as it is getting much into use among the profession in this city.—M.

tation. Even although the accoucheur should not arrive until after the rupture of the cyst, he should still instantly open the parietes of the abdomen; with the operation death is but too probable, but without it, is nearly certain.

367. In cases where gastrotomy is not applicable, we must be content to prescribe for symptoms, to moderate the violence of inflammation, to prevent as far as possible the formation of pus, to favour the production of adhesions, so as to circumscribe the effusion, to sustain, or also to diminish the strength by means of regimen or blood-letting, according as the appearances of reaction or exhaustion may seem to require; we must assist in the escape of those portions of the ovum which present themselves in the vagina, the bladder, the rectum; if abscesses form, they must be opened; and we must prevent the stagnation of pus or of any matters in a state of decomposition; in one word, we should put under contribution, one after another, accordingly as they may be indicated, baths, injections, enemata, a severe diet, an analeptic regimen, general or local bleeding, and rest or exercise.*

ARTICLE II.

OF FALSE PREGNANCY.

368. Numberless cases prove that various diseases may give rise to a belief in the existence of pregnancy in woman who are not gravid, and *vice versa*. A woman of the Fauxbourg Saint Marceau was with child, says M. Désormeaux; certain impudent quacks plunged a trocar into her abdomen, and she died in a few hours afterwards. I was called in consultation, to a lady, in order to decide whether it was necessary to perform the Cæsarian operation; the patient was affected with peritonitis of which she reco-

* Inasmuch as the diagnosis of extra-uterine pregnancy can in no case be absolutely clear and undeniable, the question of gastrotomy is one of the most difficult that can be presented to the surgeon. While the woman continues to enjoy even a moderate degree of health, I think few surgeons could be found bold enough to recommend or effect the incisions requisite for the extraction of the fœtus; the more particularly, since the patient may, as in many examples has been shown, continue to live for ten, twenty, and even fifty years, without great suffering or discomfort, and as she enjoys the further prospect of getting rid of the difficulty by suppuration, and the other modes pointed out by M. Velpeau. A Cæsarian operation would be far less dangerous than a gastrotomy for extra-uterine pregnancy, because the contraction of the womb after delivery, by the Cæsarian section, obviates the great danger of internal hemorrhage; a circumstance which cannot be predicated of the incisions into an accidental sac containing the extra-uterine fœtus. For a very excellent paper on uterine pregnancy, see Dr. James's article in North Amer. Med. and Surg. Journal, vol. iv. p. 275.—M.

vered, and a scirrhus ovarium of which she died! It is useless to invoke the rules of art against errors so gross; but there are cases so obscure that the most skilful practitioner may easily mistake their true nature. M. Lefebvre, in his thesis, has shown that even animals pretty frequently exhibit similar anomalies.

369. Retention of the menses, ascites, or encysted dropsy tympanitis, polypi, scirrhus, cancers of the womb, tumours in the ovaria, the tubes of the pelvis and other lesions besides, often produce a major part of the rational signs, and even some of the sensible signs of pregnancy. However, one must be very inattentive or inexperienced, not to avoid mistakes in almost all these cases.

370. Who can confound the symptoms of scirrhus of the cervix, and ulcers of the uterus with the phenomena of gestation, after having touched the woman? Is not the presence of a polypus most commonly accompanied with hemorrhage. Does it ever admit of *ballotement* or make us believe we feel the spontaneous motions of a fœtus? Do the progress of the affections, the state of the cervix, &c., in any case resemble those of natural pregnancy?

371. The accumulation of blood, serum, or gas in the womb might indeed impose upon us in this matter. On this subject we may refer to the memoir lately published by Madame Boivin. But if the womb is filled with *blood*, or if the person has always had difficult menstruation, the touch shows that the hymen is imperforate, that the vagina or some other part of the genital organs is not properly formed; if it be a married woman, or one whose menses had been previously regular, there will, in general, be found at the same time more or less numerous indications of disease, which clear up the diagnosis; besides, the motions of the fœtus are never met with in those cases.

372. In the case of *hydrometra* we are in possession of the same resources, and the local affection is accompanied with so serious a change in the general health, that with a little reflection error becomes from that very circumstance almost impossible.

373. In *uterine tympanitis* the womb may acquire a considerable size, but it always remains very light; there is no *ballotement*, and percussion of the belly occasions such a resonance as at once dissipates all uncertainty.*

* I seize this occasion to say that I cannot admit the existence of uterine tympanitis as a disease proper.—It is not possible to retain air within the cavity of the womb without the aid of a tampon of some sort. There is no ground to believe in the existence of such a malady.—Nevertheless, in some women, air is occasionally discharged with noise from the vagina, as I can witness, having repeatedly heard it myself in several different individuals—but this only takes place upon some sudden motion, as stooping, &c., and it consists in the expulsion of air not from the womb but from the vagina. The uterus is sometimes higher, sometimes lower down in the same woman: when it rises upwards, as upon lying down, air enters the vagina and is retained there, until, upon some sudden effort of the woman, it is forced out again, in consequence of the womb being again forced downwards by the movement of the

374. *Encysted dropsy*, fibrous or scirrhus tumours, any unnatural growth in the ovary or parts connected with the womb, might, at most, be confounded with extra-uterine pregnancy, inasmuch as the neck in those cases undergoes only very slight changes; the want also of the positive signs of the presence of a child, the general state and progress of the affections, will always suffice to prevent us from asserting that there is one, and frequently to lead us to maintain that there is no gestation in the case.

375. As to *ascites*, peritoneal tympanitis, effusions of pus or blood in the abdomen, encephaloid, fibrous, scrofulous, steatomatous, or any other kind of tumours, and the various lesions of organs contained in the belly, they are so many diseases or symptoms of diseases, which only resemble pregnancy in the distension of the abdomen they occasion, and a few other still more inconclusive signs. If the peritoneum is distended with gas, percussion will show it at once to be so: in ascites the fluid, falling to the lowest places, according to the laws of gravity, will give to the belly a form too readily distinguishable from that of pregnancy for those two states to be confounded, and the difference is still greater in all the other affections that I have just now mentioned.

376. The group of symptoms, known as *nervous* or *hysterical pregnancy*, has most frequently been the cause of error on this head. It is most frequently met with about the period of cessation of the catamenia, or in unmarried women of an irritable or nervous habit, in such as having lost their first children, are much tormented with a desire of having more, those who have remained several years in a state of widowhood, and think they have been fecundated by a second husband. The menses are suppressed, nausea, qualms, changes in the breasts, in the digestion, and sometimes all the rational signs of pregnancy supervene, and now and then the woman goes so far as to say that she feels the motions of the child quite strong; and what is more, there have been skilful accoucheurs who have partaken of the error. According to M. Orfila, Professor Dubois was not afraid to confess that he had himself been deceived.

377. A lady, thirty-eight years of age, who had had no children for twelve years, and who would have given the world to become a mother by the man with whom she was associated, sent for me in 1823 to prevent an abortion with which she thought herself threatened. According to her account, she was four months gone with child; the size of her abdomen, and numerous sympathetic phenomena seemed to confirm her assertions; she had felt the motion, and the slight discharge of blood that alarmed her had

body or change of attitude. I have also witnessed the discharge of volumes of fetid air from the womb, upon the forced removal of a putrid and crepitating placenta. But this is a case of accidental distension—and not a real case of disease worthy of the title tympanitis uteri.—M.

been provoked by violent exercise. After two or three days her fears were quieted; but they recurred again two months later. New hopes again succeeded. The period so ardently desired arrived at last; labour pains came on; a skilful midwife repaired to the woman, who was overwhelmed with joy: three days passed away in pretty severe suffering without appearing to advance the period of delivery; I was called upon; I examined her, and found the cervix as well as the body of the womb in a natural state. I pronounced her to be not pregnant; she became enraged; I was dismissed, and learned four days afterwards that her belly had fallen, that nothing had passed out from the sexual organs, and that the woman's health was restored.

378. Here, as in all analogous cases, the examination of the organ of gestation would have sufficed after the fifth month to destroy the illusion; but the patient cherished her error so dearly, that she would not permit herself to be examined; and more particularly as she entertained not the shadow of a doubt as to her condition.

I do not here treat of molar pregnancy, nor hydatid pregnancy, because moles and hydatids of the womb being nothing but products of unnatural conception, give rise to the same phenomena as natural pregnancy, and always end in abortion.

ARTICLE III.

OF PREGNANCY, AS IT REGARDS THE SEX OF THE FŒTUS.

§ I. IS IT POSSIBLE TO ASCERTAIN THE SEX OF THE FŒTUS DURING PREGNANCY?

379. When we reflect on the powerful and various reasons that should lead man to seek in the future for what may subserve or disturb his interests and his passions, the desire of knowing the sex of a child still enclosed in the womb of its mother surely seems to be quite legitimate. The woman who becomes pregnant rarely fails to attach an idea of greater happiness to one sex than to the other. In the most common conditions of social life the husband himself is often tormented with the same inquietudes. If to this sentiment which is so general be added the fears of a whole family threatened with extinction for want of heirs male; the alarm of a whole people; the various clashing designs of all nations united by the bonds of civilization when the reigning dynasty of a great empire has no hope save in the being who is as yet unborn, we shall comprehend the efforts that have in all past time been made to satisfy public curiosity on this head.

380. The gods, diviners, and sorcerers, have in turn been con-

sulted: at Rome, Livia had patience enough, assisted by her women, to complete the incubation of an egg with the warmth of her hands; being persuaded that if a male was hatched from this egg, the child with which she was pregnant would be a boy, and that the reign of Augustus might thus be continued. The Egyptians and Indians depended on the state of the heavens, or on the nature of the constellations, at the moment of fecundation; the Greeks and all the people of the ancient world used to rely upon the phases of the moon, &c. But unfortunately not one of these auspices but has deceived the credulity of poor man.

381. Founding on the debatable principle that the male embryo is sooner developed than the female, Aristotle pretends, as well as Hippocrates and many other ancient authors, that the woman quickens earlier with a boy and later with a girl. Setting out with the same idea, the relative strength of the fœtus has been transferred to the mother; it has been said that she feels more vigour, activity, gaiety, contentment; that her eyes are more lively, her face more blooming, her pulse larger, more frequent, her digestion easier; that all her functions, in a word, are executed more freely, when she is to bear a male child, than when she is pregnant with a female; that a brown or black ray along the median line of the belly, greater strength, livelier colour, nipples more prominent, a harder and tenser breast, stronger pulsation of the carotids, veins larger on the right than on the left side, announce the presence of a boy; that in getting up or walking the woman advances the right knee or foot first; that the womb is inclined to the right, that the urine is constantly loaded, that it deposits a lateritious sediment, if there be a male child; and that opposite phenomena are observed when it is of the female sex.

382. I do not think it needful to combat in a serious way the reasons by which physiologists and physicians have supported these assertions; I should not have deemed it worth while even to mention them, if they had not given rise to a crowd of prejudices that are spread among the vulgar, prejudices which the quacks make the most of, and which the ablest accoucheur is sometimes compelled to manage as well as he can, when unable wholly to destroy them. I shall content myself with observing that the several phenomena I have just now enumerated have been, and continue to be met with every day, as much, and not more for one sex than for the other; that what passes as indicating a boy, Osiander, relying upon calculations, asserts that he has most frequently observed in women who brought forth only girls, and that none of the numerous signs, established, *à priori*, upon false notions, have ever been confirmed by the careful observation of facts. All that can be said in this regard is, that certain women, when they are pregnant with a boy, feel certain symptoms, so distinct from those they experience when carrying a female, that

they can scarcely be deceived ; but then the signs attributed to pregnancy with the male sex sometimes announce the presence of a female fœtus, and *vice versa* ; most frequently there is a blending of the phenomena proper to the two opposite sexes, which always return with the same character for the same sex ; so that these peculiarities, entirely individual, only applicable to a few subjects, and moreover pretty rare, can be of no use except to those women alone who are affected with them.

383. The old women say that if the first conception takes place during the waxing of the moon it will produce a boy, but if in the wane the woman will on the contrary be delivered of a girl ; others equally skilful admit that the child will be of the same sex with the last one the mother bore, provided the moon did not change within three days after that confinement ; finally, some accoucheurs, freely trusting to chance, ascertain first what the family or the lady most desires, and very good-naturedly promise what is wanted. It is best in my opinion to pursue just the contrary course : if a girl is wanted, promise a boy and *vice versa*. The reason of this is, that if you are deceived, the woman, happy to have the sex she longed for, readily forgives your mistake, and is satisfied to laugh at your pretended skill. If it turns out as you promised, on the other hand, the parents are compelled, in spite of their disappointment, to proclaim your cleverness.

384. Here is, besides, another unfailing method : as our ancestors performed so many miracles with the moon, we may also make a small trial of the power of this wonderful planet. If obliged to declare the sex of the fœtus before its birth, we may content ourselves with asserting that it will be like the last child, provided the moon does not change within the first nine days of the lying in, and that the contrary will happen in the other event : now if the event should confirm the sentence, nothing more is wanting ; but if on the contrary it should be of the sex that was not expected, all we have to do is to go back and see that the reckoning had been badly made, that if the moon has not changed her nature, she has at least changed her phase, which amounts to the same thing ; any body may see that in this way error cannot occur, for the lunar phases recur every seven days. There is perhaps a little tricking in this course of proceeding ; but provided no more weight is given to it than it really deserves, we may, in acting thus, satisfy every body and do no harm to any one.

§ II. IS IT POSSIBLE TO PROCREATE EITHER SEX AT PLEASURE ?

385. The desire of knowing beforehand the sex of the fœtus, has given rise to one of the most piquant questions in physiology. It has been asked whether man can, by means of known influences, determine the production of one sex rather than the other ; and

this point in the science, which was discussed in the time of Hippocrates, still engages the attention of several naturalists.

386. Relying, we scarcely know on what, unless it be upon the grand idea that the strongest side belongs to the strongest being, the father of medicine teaches that both in animals and in the human species, the right testicle and the right ovary produce male germs, while female germs come from the left ; this opinion of the ancients, without having ever been generally adopted, without having ever been fortified by a single direct experiment, has nevertheless passed down for ages, and claims even in our day some partisans, even among learned physicians. However, admitting the fact, one great difficulty would still remain to be got over in applying it. How shall the seminal matter of the right gland, rather than that of the left, get into the womb, and *vice versa*? In quadrupeds, indeed, it would be possible to take away from one the right and from another the left prolific gland ; but what man would submit to such a mutilation for the sake of being able to procreate a boy rather than a girl? Another expedient was evidently necessary; and Millot has gravely advised the couple to lie, during a fruitful copulation, on the side where the germ of the sex they desire to have is found. We might to a certain extent excuse the ancients, who believed that the human uterus was two-horned like that of brutes, for entertaining such an opinion, for believing that the semen of the right ovary would perhaps stop in the right horn, provided the two individuals took the precaution of lying on the corresponding side during the coition ; but in the nineteenth century such conjectures are merely subjects for ridicule, and scarcely deserve the trouble of refutation.

387. Moreover, it is actually demonstrated that the basis of this hypothesis is entirely false. Legallois caused rabbits from which he had removed one ovary to be covered, and found that it did not prevent them from engendering young of different sexes ; as to the human species, without mentioning the cases of men who having lost one of the genital glands have notwithstanding procreated both boys and girls, I will relate two facts that are decisive on this subject. A woman died some years ago at the Maternité at Paris ; she was the mother of ten or twelve children of both sexes; nevertheless her sexual organs were so disposed, that there were only one ovary and one tube attached to the corner of a womb which was itself reduced to one of its halves. In the case by MM. Jouvot and Garnier, communicated to the Academy by M. Ollivier (d'Angers), it appears that the woman had been confined five times ; that she had had four boys and one girl, that the first four pregnancies seemed to have been effected in the left uterine sinus, and the fifth and last only in that on the right side. Lastly, all naturalists know that, in animals, where the uterus is completely

bi-lobated, the same horn is often filled at the same time with both male and female fœtuses.

388. While doing justice to these suppositions, physiologists have, notwithstanding, retained a hope of one day ascertaining the conditions which cause one sex to be born rather than the other. M. Bory-de-Saint-Vincent has already emitted the bold opinion, that certain organic particles are susceptible of passing with nearly the same facility into the vegetable or animal state. Mr. Edwards thinks he has observed that the molecules of several *confervæ*, and other beings of doubtful nature, may be at will transformed into individuals of either organic kingdom. Finally, there were communicated, in 1825, to the *Société Philomatique*, certain researches which would tend to induce the belief that by modifying in a certain way the influences under which the fecundation and entire reproduction of insects are effected, it is possible to occasion the production either of males or females at pleasure.

389. The ancient agriculturists were convinced, and country people still think, that if the north wind prevails, that if the season be dry and cool rather than warm and moist, when goats, sheep and cows are admitted to the males, there will be fewer females produced, than under the influence of a contrary state of the atmosphere. They are persuaded, moreover, that in order to obtain a larger proportion of males, there is no better plan than to cause the females to be covered by the most vigorous animal of the kind. They therefore take care to choose the most active, the strongest, the youngest and most robust buck, or ram, or bull, or stallion they can find.

390. Besides, these traditions have been lately subjected to the test of experiment, and fully confirmed by the interesting researches of M. Giron De Bussaringue. Numerous observations have been made by this philanthropic cultivator, on horses, cows, sheep, birds, &c., for several successive years, and according to all appearance, with the greatest care. Now, they go to show that the stronger the male at the period of fecundation, the greater is the chance of obtaining males. For instance, in a flock of sheep, those that are first covered produce fewer males than those that come immediately after them, and these many more than the last moiety; for the ram does not appear to enjoy his whole prolific energy until after a certain number of copulations, and afterwards he becomes exhausted, gradually losing his strength.

391. Other reasons still may be cited in support of those above mentioned; pigeons, doves, partridges, and many other birds that unite in couples, during each season of their loves, produce nearly the same number of males as of females. The gallinacæ, the common fowl, on the contrary, and geese, ducks, turkeys, &c., where the same male suffices for several females, furnish many more females than males of their respective species; while bitches,

cats and she wolves, which ordinarily permit the approaches of several dogs, &c., engender more males than females. In fine, it is supposed that where polygamy is allowed in the human species, as in Persia and Turkey, there are more girls than boys born, and that in Europe where this custom is not tolerated, the contrary is generally found to be the case, or at least that the proportions of the two sexes are about equal.

Consequently, it becomes probable that the nature of the sex is determined by that one of the couple whose prolific power, whether absolute or relative, is greatest at the moment of conception. It is true that numerous researches are yet necessary to transform this proposition into a mathematical truth; but if it should ever be confirmed by authentic and careful observation, it is evident that the act of procreating the sexes at will, will no longer be a chimera, and that we ought not give up the hope of being able to predict to pregnant women, that they shall be delivered of a boy rather than of a girl. But it is doubtful whether, by adopting the course and language of M. Mayer, we shall ever attain to any thing satisfactory on this interesting point of physiology.

§ III. OF THE INFLUENCE OF THE SEASONS AND OF PUBLIC PROSPERITY ON THE PRODUCTION OF THE SEXES AND ON THE PROPORTION OF CONCEPTIONS.

392. An important inquiry, and which flows naturally from the preceding, would be to know, whether in poor countries or in years of scarcity and in provinces where the inhabitants are naturally weakly, idle and wretched, the female sex exceeds the male in number: in order to resolve it, it would be necessary to consult the records of the civil state of people in the most opposite conditions; this work, which several moderns are on the point of undertaking, has by M. Bailly been already performed for the city of Celles, from which it appears that the proportion of girls is decidedly larger than that of boys in that barren and poor canton. However, M. Villermé, who devotes himself with such praiseworthy ardour to this branch of statistics, and who has made his observations on a much larger scale, has not come to the same conclusions; he has found that, in Sologne and other very poor departments, there is born as large a proportion of males as in the most opulent and agreeably situated cities; that the miserable peasants of Scotland, reduced to the necessity of living on potatoes and beans, procreate as many male children as the rich inhabitants of the environs of London.

After all, though it be right to state that prosperity or misery exerts no marked influence on the proportion of the sexes, there is no reason why we should be surprised at it; for men and women are placed in the same circumstances. That merely proves that

absolute force is not in this case one of the essential conditions, but it does not in any respect diminish the important bearing of the relative force of the couple.

393. There is no one who has failed to remark that births are more numerous at certain times and in certain countries, and more rare in others; but no attempt has been made to explain these apparent anomalies, nor to prove that they were in some degree fixed in their recurrences. M. Villermé has taken upon himself this double care: in a memoir read to the Academy of Sciences, he says that out of a total of 7,651,437 births, reduced (*ramenées*) to 12,000, 1093 took place in January, 1136 in February, 1117 in March, 1057 in April, 1000 in November, 981 in December, 981 in September, 964 in October, 965 in May, 927 in August, 896 in June, and 884 in July, and that, consequently, the relative frequency of conceptions is far from being the same at all seasons of the year.

394. M. Villermé, always relying on calculations, in the same way passes successively in review the influence of holidays and public rejoicings, the first period of marriage, fasts and privations, temperature, latitude, vegetable or animal regimen, prosperity, civilization, liberty, the poverty and the calamities of the population, on the number of fecundations, and demonstrates that many more children are born under a fine climate, in countries where the arts, industry, commerce and the sciences flourish, where the air is salubrious and the earth fertile, than in the contrary conditions; that famine and years of scarcity especially occasion extraordinary changes in the rate of population, &c.

In regard to the faculty of procreating at will children that shall be beautiful, endowed with great genius, and without bad passions, I can only refer the reader to the *Callipédie* of Cl. Quillet, to the *Megalanthropogénie* of M. Robert, or lastly, to the *Traité de la Philopédie*.

CHAPTER IV.

OF THE HUMAN OVUM.

395. THE human ovum, like that of other mammiferæ, is composed of the fœtus and its appendages.

ARTICLE I.

OF THE APPENDAGES OF THE FŒTUS.

396. The appendages of the fœtus consist of the membranes, the placenta and cord of the umbilical vesicle and allantois, and of the liquor amnii.

SECTION 1.

Of the Membranes.

The covering of the ovum is formed of three concentric layers, the caduca, the chorion and the amnios.

§ I. OF THE CADUCA, OR CONNECTING MEMBRANE.

397. The caducous membrane, *membrana decidua, cellulosa, sinuosa, spongiosa, common* or *pre-existing* membrane, *connecting* or *conjunctive* membrane, *epichorion*, &c., is so evident at all periods of gestation, that it must have been noticed by every physiologist who has paid much attention to the examination of the human secundines. Thus Aretæus speaks of it pretty clearly under the name of *porous layer*; Fabricius under that of *membranous substance of the placenta*; G. Fallopius under the title of *fleshy substance*, &c.; Spigelius under that of the *thick and fleshy portion of the chorion*; Ruysch under that of the *velvety chorion*; Rouhault, Littre, Hoboken, under that of *chorion*; Haller under that of *external* or *fungous chorion*; lastly, Needham, Diémerbroeck; Noorthwyck, with Hoboken, Rouhault and Littre, have described it by the name of chorion, while to the true chorion they give the name of allantois; but these obscure descriptions were only fit to hinder the re-

searches of observers, and can in no respect be compared with that given of it by W. Hunter.

398. *Formation.* Impregnation determines in the uterus, a specific irritation, which is promptly followed by an exudation of coagulable matter which concretes and soon transforms itself into a kind of sac filled with a transparent and slightly rosy fluid. In contact with the whole extent of the parietes of the uterine cavity, this kind of bladder or membrane continues in some instances within the origin of the Fallopian tubes, and always into the upper part of the cervix, in the shape of solid concrete cords; it never in a natural state has any opening.

399. The ovule, after having passed through the tube, necessarily depresses the caducous membrane, so that it may glide on betwixt it and the uterus, to the internal surface of which it at last attaches itself; from this moment the pre-existing membrane is composed of two portions: one, very large, lining the whole interior of the womb, except the part which is in contact with the germ, bears the name of *uterine* or *external caduca*; the other, very small, depressed by the lower half of the fecundated vesicle, which it envelops, constitutes the *reflected caduca*, *internal caduca* or *epichorion*. The extent of the former augments in the same ratio with that of the womb, and the aggrandizement of the latter necessarily follows the growth of the germ. Therefore the cavity which separates them, and which is nothing more than the altered cavity of the primitive sac, is the greater, the nearer we are to the first periods of gestation.

400. The uterine caduca preserves a pretty considerable thickness, especially in the vicinity of the placenta, until the close of pregnancy; the epichorion, on the contrary, grows insensibly thinner, so that at the period of labour it is sometimes of an extreme tenuity.

One, by sinking down into the other, at length comes to be in contact with it, a little sooner or later, about the fourth month, for example; after this, the two layers remain in a state of more or less perfect contiguity until the expulsion of the after-birth, without, however, being even confounded together, notwithstanding the assertions of Hunter and all others who have treated of this subject since his day. It is evident, then, that this membrane is managed in regard to the ovule, as the pleura is in relation to the lung, or as the serous membrane of the pericardium is in respect to the heart.

401. The *external surface* of the caduca is uneven and porous, in contact with the interior of the womb, and invests the chorion as far as to the circumference of the placenta, but is not prolonged over the spongy surface of that body: to the former its adherence is very slight and is effected only by means of mucous filaments very easy to break, and which certainly are neither vessels nor

nerves; to the latter the union is much more intimate, and so much the more so as the development of the ovum is more advanced. During the first two months, indeed, it is pretty easy to extract the ovule from that portion of the sac which constitutes its epichorion; while at a later period, the numerous filaments that habitually invest the germ contract such solid adhesions with the reflected caduca, that it becomes more and more difficult to effect this separation without rupture.

402. The *internal surface* being moistened by a fluid, although tuberculated, is nevertheless smooth, and lined with an extremely delicate pellicle. After the fluid has disappeared and the reflected portion has come to be in contact with the uterine layer, this surface soon assumes the characters of the former. The *liquid* which fills the cavity of the caduca, and keeps its two surfaces apart, is sometimes quite limpid, but most commonly reddish, viscid, similar to melted glass, or rather to white of eggs, and appears to be composed of a large proportion of water, and of albumen, and gelatin.

403. *Circumference.* At the place where the caduca turns back so as to invest the ovum, it forms a circle, which at first exhibits the form of a fold more or less regularly rounded, but which afterwards is gradually transformed into a thin and sharp edge, and ends at last by being more or less evidently continuous with the circumference of the placenta.

This is a point in the history of the connecting membrane on which I most insisted in 1824, and is, notwithstanding, one on which the greatest doubt has remained in the minds of observers.

404. Hunter, Baillie, Wrisberg, Krummacher, Blumenbach, Stein, MM. Lobstein, and Meckel, Béclard, &c., have indeed admitted the two laminæ of the caducous membrane, but still persist in the belief that the placenta does not fix itself to the womb until after having passed through them.

405. Chaussier and M. Dugés, on the contrary, suppose that the uterus is at first merely filled with lymph or coagulable albumen; that the little egg, on arriving from the ovary, dips into the midst of this substance, and becomes covered with it; that the villi of the chorion must be confounded or blended with it in order to form the placenta, and that, in consequence of the growth of the womb, the caduca, at first single, is separated into two layers. But I now possess so many facts in favour of the doctrine laid down above, that I cannot unite in any respect with the sentiment of these authors.

406. Ruysch, Haller, the two Hunters, M. Lobstein, and all those who have treated at some length of the *membrana caduca*, say they have met with vessels in it, even in great numbers, and, consequently, that it is organized. I, on the contrary, do not believe that it is organized at any period of gestation. It is so easy

to convince one's self of its inorganic condition by examining it in a fresh after-birth, that I can hardly understand how this remark has escaped the attentive observers whom I have above mentioned, as well as all those who have succeeded them.

By examining it previously to the end of the second month, it will be found to be soft, supple, spongy; that it is very elastic, tears with extreme facility, and contains not a vestige of organic elements; that it is only contiguous to the womb, and adheres to the chorion merely by means of the villi that always cover the ovule.

At the close of pregnancy, it preserves the same softness, the same elasticity: it is always of a reddish-gray colour, easily reducible into shreds; its adhesions to the uterus have not undergone any change, only its epichorion layer has become considerably thinner, in consequence of the mechanical distension it has been subjected to; its composition is in all respects the same as at first; in one word, from the instant of its formation, until its exclusion from the sexual organs, it has never appeared to me that the caduca could be regarded in any other light than as a simple inorganic layer; however, I can affirm that I have carefully examined it in more than four hundred specimens discharged at full term or by abortion.

407. It is true that it is sometimes sprinkled with reddish, stellated points, or bloody striæ, which might, under certain circumstances, induce a belief of the existence of vessels in its substance; we may also see, especially on its inner surface, an extremely delicate pellicle, which might frequently be mistaken for a cellular coat; lastly, it also seems to be pretty frequently formed of fibres placed side by side, or even interlaced in various directions; but these spots and striæ of blood no more indicate the presence of vessels here, than when they are met with on those membraniform concretions that are thrown off by children in croup, &c.

408. If this membrane were really organic, if it were the seat of a real circulation, can we conceive that it would never contract any adhesions, that it would not be intimately blended with the internal surfaces of the womb, and the external one of the chorion, which it lines for nine months? Finally, to decide the question, it should suffice us to remember that the characters of this singular membrane are in every respect similar, at the moment of parturition, to what they were at the commencement of pregnancy, a period wherein nobody has pretended to have seen a trace of organization.

409. If, then, the caducous membrane is not an organic membrane, if it is merely an *adventitious* coat, as M. Blainville calls it, or the result of a concretion taking place in the uterus, the

name of *anhistous** membrane which I propose to bestow upon it, and which is synonymous with inorganic membrane, appears to me to be the only one that can be advantageously applied to it.

410. *Uses.* I shall not stop to combat the opinion of those who think that the *anhistous* membrane serves to nourish the fœtus during the first weeks of its existence; to remark that the umbilical cord is always inserted on that portion of the ovule which is not covered with this concretion, ought to be sufficient to demonstrate that it is unconnected with the nutrition of the first lineaments of the fœtus. Its use is to sustain the vesicle on some one point of the uterine cavity. I know it may be objected that it fixes and maintains itself as firmly in animals as in women, and just as well in extra-uterine as in natural pregnancy; but in brutes, the surface of the ovule, and the form of the parts through which it has to pass, are far from being in all respects similar to those that are noticed in the human species. The uterine horns in brutes differ from the human uterus in this respect, that they never dilate enough to permit the germ that passes through or stops in them to be in contact with all the points of the circle to which it corresponds, in one of those organic tubes. Further, when the product of fecundation accidentally develops itself in the peritoneum, or the tube, or even in the substance of the uterus, it remains uniformly contiguous to the walls of the cavity which it has appropriated; so that the *caduca*, such as I understand it, is not at all necessary in these two circumstances, and its absence, therefore, does not at all prove that in relation to ordinary gestation it has not the uses I have just assigned to it.

Another use of the *anhistous* membrane seems to me to be to circumscribe the placenta, and determine the place of its insertion; but I defer the examination of this point to another article.

411. *Analogy.* Those who have embraced the opinion of Hunter have asserted that the *caduca* does not exist except in women, and they were so far right, that it has nowhere been found possessed of the same characters it exhibits in the human species; but if, laying aside the idea of a complete analogy, we are content to seek for its elements, more or less modified in other vertebral animals, we soon perceive that it is in almost all of them replaced by a coat which is equally inorganic. Thus, in the ophidian reptiles its analogue is a simple mucous *induitus*; in the batracians it is represented by a similar but much thicker layer; in birds, notwithstanding what M. Dutrochet has said, the calcareous shell is its substitute, and as M. Cuvier has already maintained; lastly, in almost every species of the mammiferæ, there is to be found a lamella on the external surface of the chorion, which is sometimes nearly fluid, at others pretty consistent, and of a con-

* From *ιστός* tela, and *a* primitive.

siderable thickness, of a greenish or yellowish colour, and which serves as a caduca.

§ II. PROPER MEMBRANES OF THE OVUM.

A. *Of the Chorion.*

412. To prevent, for the future, the chorion from being confounded with any other membrane, it will suffice to remember what I have just said concerning the caducous membrane, and that it constitutes the first organized or solid tunic of the ovum as we pass from the womb to the fœtus, and the second in proceeding from the fœtus to the womb.

413. *Primitive condition.* In a production of ten or twelve days standing, the chorion presents the appearance of a velvet-like hydatid, or a small transparent vesicle; its external surface, free from all adhesions, is somewhat fungous or fretted throughout its whole extent: its anterior is filled with a clear serous fluid.

414. In products of three or four weeks, the chorion is not smooth on both its surfaces, as has been erroneously stated by a multitude of commendable writers. I have never, whatever care I may have taken, seen it smooth exteriorly, nor velvety internally. At a fortnight, at three weeks, at one month as well as at two, I have always found its external surface covered with the same down, its internal surface even and polished, and its transparency neither more nor less decided than at any other period of gestation.

415. *Granulations and villosities.* It is generally thought that the down that covers the chorion is of a vascular nature; but as early as 1823 I ventured to oppose this hypothesis. What proves that the filaments of the chorion are not vessels is this, that they are to be seen before blood-vessels of the cord are recognizable. Besides, until the sixth week, every flock is at least as large as one of the umbilical vessels; so that as there are only three of these, it is difficult for them to give birth to the others, which amount to several hundred. Further, these villosities, all independent of each other, are regularly spread over the whole periphery of the ovule, while the cord and placenta are only connected with one point of this vesicle; and notwithstanding the efforts of an infinitude of very able anatomists, nobody has proved that they are hollow rather than concrete, vascular rather than solid cellular filaments; lastly, when examined with a lens, they are found to form certain areolar spongioles, and not permeable conduits.

416. The *abnormal* continuance, or preternatural growth of the swellings above-mentioned have led me to suppose that such hydatids as are found in bunches in the womb are not vesicular worms, as is commonly supposed, but rather the product of an abortive

ovum, whose small gangliform bodies have taken on an unnatural growth. I am in possession of a considerable number of specimens which sustain this view of them; some of them I have shown to M. Désormeaux, and again, very recently, M. Delange, physician at Falaise, has sent me one, the examination of which leaves no doubt on this point. My opinion on this subject is further fortified by the cases of Albinus, Wrisberg, Reuss, Sandifort, and even by those recently made public by Madame Boivin.

417. Until the third, fourth or fifth week of pregnancy, the inner surface of the chorion is in contact with a very delicate lamella, constituting part of a peculiar body which I shall, provisionally, denominate the *reticulated sac*. From this period until the sixth week or second month, it is no longer separated from the amnios except by a perfectly transparent, vitriform substance. In the natural state, this substance never contracts any intimate adhesions to any organ capable of altering its natural appearances.

418. According to Needham, J. Fabricius, Noorthwyck, Harvey, Lacourvée, Hoboken, Littre, Rouhalt, &c., the thickness of the chorion is considerable; but the error of these anatomists evidently depends upon their having confounded the chorion and caducous membrane under the same title.

I have studied the chorion, whether at term or other periods of pregnancy, in a great number of specimens, and have always found in my dissections, that it is everywhere transparent and thin, as well upon the placenta as elsewhere. This, indeed, is a fact, which any one may readily ascertain, by taking care to macerate a natural after-birth in water, so as more easily to separate the reflected caduca from it. Then the appearances of the chorion are found to be exactly the same throughout: so that the thesis of Phil. Béclard, and M. Meckel's Manual of Anatomy, contain several manifest errors on this subject.

Hewson, and many who preceded him, have asserted that the chorion is formed of several coats, which, being early applied to each other, come at last to constitute only a single one; that the placenta results from the unfolding and thickening of these laminæ, from which each of the umbilical vessels receives a sheath, &c. But I have already shown, in 1824, that the reason of this supposition probably depends upon the presence of a concrete lamellar layer, which indeed does invest the vascular roots of the placenta, and separates it from the external surface of the chorion. At present I may add, that if Ruysch, Haller, and so many others, supposed the chorion to be constituted of a variable number of layers, it was because they had never separated it from the membrana caduca; but I do not understand how MM. Chevreul, Maygrier and Dutrochet could have ever reproduced this old notion.

At a fortnight, and at three weeks, as well as at two months, the chorion in the human subject is simple, and although, at a

later period, other laminæ become connected with it, they belong to bodies not as yet described, and which cannot, under any pretext, be considered as its appendages.

419. Hippocrates has pretended that the membranes of the fœtus arise from the umbilicus. Harvey has said that the chorion, the amnios and chord, are merely prolongations of the child's belly; and Burton, defending the same opinion, expresses himself still more positively on this subject. I myself related some cases, in 1824, in support of such an hypothesis. At the same time an Italian anatomist, M. Mondini, contributed to strengthen it by means of some particular researches and reasonings. M. Moux states that the chorion, after investing the chord, is continuous with the derm of the fœtus. It should be remarked that M. Chevreul is of the same opinion. Finally, M. Blainville seems to have held a similar opinion.

But the chorion constitutes a part of the ovule at the moment of fecundation; the abdominal parietes are not developed until after the spine; the chorion presents the same characters and form before the appearance of the skin that it exhibits afterwards; the chorion and the skin are therefore two parts quite independent of each other.

420. The chorion can be referred neither to the derm, the muscles, the aponeuroses, nor peritoneum; however, it is difficult to call in question its cellular nature, or to deny its analogy with the serous membranes, of which, besides, it presents all the characters, whether physical or physiological. Does it contain nerves and lymphatic, sanguineous, exhalant and inhalant vessels?

These two last-mentioned kinds of vessels having only been admitted in animal bodies upon the say so of the physiologist, especially Bichat, who never saw them, it is good philosophy to reject their existence without discussion, until they shall have been demonstrated by more conclusive proofs. The same may be said of the lymphatics, which the imagination alone of Schræger and some others seems to me to have detected in the chorion. As to nerves, I think I may say, without offence to Chaussier, MM. Ribes, Home, and Bauer, that they are no more to be found there than the exhalants and lymphatics.

421. The question in relation to *blood-vessels* deserves much more attention. Admitted by a great many *savans* of the highest merit, and that too upon a certain number of proofs; rejected by other authors not less able, and upon considerations not less powerful, it becomes, upon that account merely, very difficult to settle one's opinion in relation to them.

In attempting to separate the reflected anhistous coat from the exterior surface of the chorion, we soon perceive an indefinite number of filaments passing from each one of these laminæ to the other, and which are more numerous as we approach the circum-

ference of the placenta, or are nearer to the commencement of the pregnancy. But these filaments, which Sandifort and others mistook for vessels, are nothing but the remains of the villous *tomentum* of the ovule, and not canals carrying on any circulation whatever. The chorion exists before the embryo; with the exception of the portion that is to support the placenta, it is completely separated from the womb by an inert stratum; the umbilical and placental vessels do not make their appearance in the new being until the ovule attaches itself to the internal surface of the uterus; it is only, therefore, in the area circumscribed by the reflection of the anhistous membrane, that the villi of the chorion can allow any vessels to be developed.

422. The chorion is met with in all the vertebral animals; but with such modifications that most physiologists have been unable as yet to agree concerning its nature: in the batracian reptiles, as in women, it forms the covering of the ovule; in the saurians it exhibits a much greater thickness and solidity, although it has the same relations with the organs of the female. In the ophidians it composes that membrane which is so dense and difficult to break, and which constitutes the shell or outer covering. In birds the chorion is much farther removed from the vitellus, and in fact is not formed until after several other laminæ. This is the membrane that lines the inner surface of the calcareous shell, and which is known as the membrane of the shell. Finally, in the mammiferæ, as well as in the human species, it supports the placenta or the cotyledons, and throughout the remainder of its extent is separated from the womb or its horns, only by an inorganic layer of variable consistence and thickness.

B. Of the Amnios.

In the opinion of all observers, the amnios, also designated by the terms *amiculum*, *cuguelette*, *aurelia*, *charta virginea*, &c., is the inner membrane of the human ovum; smooth, transparent, separated from the fœtus by the fluid which bears the same name, it slightly adheres to the chorion by means of the mucous filaments or lamellæ which cover its outer surface.

423. In an abortion of from *ten to twelve days*, for which I am indebted to the kindness of Madame Lachapelle, and which was only four lines in diameter, I found inside of the chorion a small transparent sac, on the upper part of which the microscope detected an opaque corpuscle of a whitish colour. Did this little sac represent the amnios? Was the white point the embryo?

In an ovule of *twelve or fifteen days*, presented to me by M. Bermond, of Bourdeaux, I found fixed on a part of the cavity of the chorion a small transparent sac about three lines long.

In another of about *three weeks*, and for which also I am indebted

to the extreme complaisance of M. Bermond, the amnios represented a vesicle three or four lines in diameter, and was stuck, as it were, on the inner surface of the chorion.

In a fourth very perfect specimen of about *twenty days*, which Madame Charonet was good enough to give me in April 1825, the ovule separate from the reflected coat of the anhistous membrane, measured only eight or ten lines; the amnios, excessively delicate and white, was separated from the embryo only by a space of a line and a half, and after being reflected along the origin of the cord, seemed to be continuous without any line of demarkation with the integuments of the little fœtus, which, further, was well formed.

In an ovule of about *an inch in diameter*, aged three weeks or a month, given me by Madame Le Brun, the amnios formed a little sac, separated from the fœtus by a moderately thick stratum of fluid, and which left the greater portion of the card exposed in the cavity of the chorion.

In an ovum received from M. Fournier, Surgeon of the Royal Stables, which, from the accounts of the woman, and the size of the chorion, must have been from two months and a half to three months old, but which, from the size of the embryo, seemed not to be more than *four or five weeks*, the amnios was a sac three or four times smaller than the chorion, and was reflected along the chord at the distance of a line and a half from its root, so as to give it a sheath quite up to the belly. This amnios, besides, presented all the characters of the normal state.

In an ovum of *six or seven weeks*, presented to me by Madame Lachapelle, the amnios, nearly as large as the chorion, had begun to reflect itself in the form of a funnel upon the cord, at the distance of six lines from the navel, which it reached after enveloping the vessels, the pedicle of the vitelline sac, the intestinal bulb, &c.

In another *older* ovum, which was brought to me by M. Morisse, an accoucheur at Paris, the amnios was still separated by a considerable space from the chorion, and was applied to the cord so as to sheathe it, beginning at the place where the prolongation of the umbilical cord was implanted, and extending as far as the belly, where, according to all appearances, it was continuous with the epidermis.

In a specimen of *eight or nine weeks*, which M. Boulon d'Abbeville gave me, the external surface of the amnios touched, so to speak, the chorion, and invested the whole of the cord, which, already very long and spiral, still contained the intestinal mass in one of its enlargements.

In one of at least *three months*, very perfect, which M. Morisse procured for me twenty-four hours after it had been passed by the woman, the epidermis was so entirely separated from the other parts of the fœtus by a thick stratum of slightly muddy serum, that

it might have been removed with the greatest ease ; the same was observed along the cord from one end to the other ; only the pellicle was here close to the vessels at four different points which gave rise to four contractions and four vesicles placed at equal distances ; but the adhesions of the amnios at the contracted spaces of the umbilical cord, and those that the epidermis had preserved with some portions of the limbs, did not prevent me from remarking the most perfect continuity between all these lamellæ.

424. From these notions it follows, that during the first fortnight of gestation, the amnios has no immediate connection with the foetal end of the umbilical cord, on which, at a somewhat later period, it doubles, so as to furnish it with a sheath, and place itself in contact with the inner surface of the chorion ; that this disposition is maintained, saving in a few exceptions, until the abdominal parietes are completely formed ; that until then there is no continuity between the amniotic membrane and the epidermis, but that this continuity is afterwards difficult to deny.

425. It also follows, that the amnios is far from touching the internal surface of the chorion at all periods of pregnancy, as is generally supposed, but that these two membranes are, on the contrary, separated from each other by a considerable space, during a period which differs in different individuals.

This *space*, which is at first very large in proportion to the cavity of the chorion, much larger than the amnios itself during the whole of the first month, afterwards diminishes by degrees, in proportion to the increase of the amnios, so that at two months it about equals that which separates the embryo from its envelop ; at length the disproportional growth of this last-named membrane causes it to disappear almost entirely, so that towards the fourth or fifth month we are obliged to suspect, in order to be able to recognize its existence.

426. It is useless to repeat what I have said as to the non-existence of vessels in the proper tissue of the chorion, for the purpose of showing that they are far more certainly wanting in the amnios : indeed, nothing leads us to admit of their existence in the latter ; it is never covered with villi like the former ; it never has any intimate connection with any vascular organ, and all that has been said upon the subject by various authors, in fact, consists of mere assertions, or rather of pure suppositions.

As the remarks in this article prove evidently that the amnios forms only one single coat, at the various periods of gestation, I shall not stop to combat those who have thought it to be composed of several layers in the commencement of its development.

§ III. OF THE WATER OF THE AMNIOS.

427. Besides the foetus and the cord, the amnios contains a fluid called the *water of the amnios*, or amniotic liquor.

428. At the beginning these waters form but a thin stratum; their proportional quantity afterwards increases rapidly, until towards the end of the second month, when the inner membrane of the ovum comes in contact with the chorion: at three months the weight of the amniotic fluid considerably exceeds that of the fœtus; but at term the weight of the fœtus, in turn, considerably exceeds that of the fluid in which it floats. At birth, in fact, there are commonly not more than from ten to thirty ounces of fluid. However, it would not be correct to say, with Madame Boivin and several others, that the quantity of fluid diminishes in an absolute manner from the middle of pregnancy until the moment of parturition. It is, on the contrary, certain that it augments until the close, but in less proportion than at the commencement of gestation.

But in this respect very great differences are observed; instead of one pound, there may be two, four, and even ten pounds, or only a few ounces; its abundance is generally in an inverse ratio to the vigour, size, and strength of the fœtus, and robust constitution of the woman; so that a fœtus weighing five pounds, for example, will float in two, three, or four pounds of the water, while only three or four spoonfuls will be found about a child of eight or nine pounds weight.

429. According to some authors, its nauseous insipid smell somewhat resembles that of semen; on the whole, it is nearly similar to that exhaled from the belly of a slaughtered animal: unctuous, possessing rather more consistence than pure water, the liquor amnii is clear, like simple serum, or of a slightly citron or greenish colour, ordinarily transparent; it is not unfrequently lactescent, thick, mixed with albuminous flocks, of a gray, yellow or blackish colour; its taste is both sweetish and slightly saltish; in some cases it is so acrid and astringent as to pucker the skin of the accoucheur's fingers, when he keeps them beyond a few seconds in the vagina or womb.

430. It does not appear to contain more animal matter in the first than in the last half of pregnancy, and in this respect the remarks of Harvey, Lacourvée, Ruysch, and Osiander seem to me to be wholly faulty; its chemical composition is very complicated, and besides, has only been studied in animals. MM. Vauquelin and Buniva found it to contain: water, 98·8; albumen, salts of soda and lime, 1·2. M. Berzelius says that it contains fluoric acid; Scheele says he found free oxygen in it; M. Geoffroi Saint-Hilaire admits that it contains atmospheric air in a state of mixture: but MM. Lassaigue and Chevreul, at a later period, discovered that what one of them had mistaken for air, was nothing but a gas composed of carbonic acid and azote.

431. The chemical nature of the water of the amnios differs, as has been truly said by Van-den-Bosh, from all the other fluids of

the body. The acids, alcohol, ebullition coagulate it only with great difficulty, or even not at all: some suspect it to contain a free acid; others an alkali; but one of these opinions must be incorrect, for acids, as is well known, do not remain in contact with alkalies without soon forming salts. From all the foregoing, we may conclude that the composition of the amniotic liquid requires new analysis.

432. Trusting to certain experiments of Monroe, who by injecting warm water into the uterine vessels, found it to transude upon the inner surface of the amnios; to Haller's assertion that the waters become impregnated with the odour, colour, and even nature of medicinal substances taken by the woman; to the existence of supposed vessels between the womb and envelop of the ovum, most physiologists have admitted that the liquor amnii is directly furnished by the mother. Others, however, have maintained the contrary, and believe with Scheele, Winslow, Van-den-Bosh, and M. Lobstein, that it comes chiefly from the fœtus, particularly from the placental vessels; Chaussier, Bécларd and Meckel seem to hold a mixed opinion, and endeavour to reconcile both the above hypotheses.

433. Those who refer the liquor amnii to the fœtus, have placed its *source* in the sweat, the insensible transpiration, or the urinary secretion, or in the glands or particular bodies of the placenta, or in the vessels which Needham, Fabricius, Ruysch and Haller say they observed betwixt the lamellæ of the amnios; some of the ancients made of it a *colliquamentum*, coming from the semen, &c. Such as attribute it to the mother merely say that it is poured out by the exhalation in the interior of the ovum.

434. I do not think it would be useful to refute these opinions one by one; I shall content myself with remarking that there is no vascular connection betwixt the womb and the membranes; that the spongy coat is separated from that organ by an inorganic layer, the *membrana caduca*, and that for more than a month the amnios does not even touch the inner face of the chorion, to show that the fluid in question is not derived immediately from the uterus; the proportional quantity of the liquid being much greater in the first period of pregnancy, ought also to suffice to show that it cannot be supposed to come directly from the fœtus.

Every thing proves that the water of the amnios is the product of a transudation, or of a simple exhalation, like the serosity of the pleura, the pericardium, the peritoneum or arachnoid, and like the synovial fluid of the tendinous sheaths, or of the articulations; and that this perspiration does not require for its production the existence of special canals; that it is an instance of mere vital imbibition: the viscid matters, the muddy appearance, the yellow or greenish flocks frequently met with in it, do not in any respect belong to it; for they are nothing more than portions of meconium, or

of the *induitus* separated from the fœtus, or even of the vitriform substance, and also of the vesicles which exist primarily between the membranes.

435. Its *uses* are, 1. To favour the active or passive motions of the fœtus, which, if it were without the liquor, would be every where pressed by the uterus, and could not develop itself; 2. To permit the isolation of the limbs and of their different parts; to prevent the fingers from remaining in contact and adhering together; to oppose the adhesion of the forearm, or of the legs and thighs to the breast and abdomen, as happened in a case related by M. Morlanne, where the fœtus was born with such adhesions six weeks after the discharge of the waters; 3. To protect the child against the shocks and jars that might be experienced by the mother, and particularly by the womb; to protect the tender being from all kinds of compression, and to furnish it with a kind of tepid bath which might favour the circulation of its fluids, and afford to it a facility for moving according to the laws of gravitation, and to have the head always directed towards the neck of the uterus; 4. To keep the membranes always apart, maintain the dilatation of the womb, and keep up a gentle pressure upon the cord and surface of the child; 5. In labour, to permit the formation of the bag of waters, a real segment of a sphere, which, by gradually engaging in the cervix, singularly promotes its dilatation; 6. After the rupture of the membranes, to lubricate the genital organs, to soften them, and thereby render the passage of the head easier and less painful; 7. Lastly, to render operations much more simple and free from danger when compelled to introduce the hand into the womb.

SECTION 2.

Of the Vesicles of the Embryo.

§ I. OF THE UMBILICAL VESICLE.

436. The umbilical vesicle is an organ that was unknown to the ancients, of which much has been said by the moderns, either with a view to place its existence beyond doubt, or on the contrary to reject it as among anomalies or pathological changes, but which has not been described so exactly as to enable physiologists to get a clear idea of it.

Albinus was the first author who really observed it, and had a drawing made of it: if several persons have supposed they could discover some notions concerning it in the works of a remoter period, that is because the same anatomists, having seen it only a few times, they were often mistaken in regard to its characteristics.

437. It is wrong, for example, for MM. Lobstein, Béclard and Meckel, to carry the knowledge of it back to the times of Needham and Diémerbroeck, or even of Ruysch; MM. Oken, Dutrochet, Béclard, Meckel, Bojanus, &c., taking as a type the one prescribed by M. Lobstein, have asserted that the umbilical vesicle is at first supported by the front of the embryo spine; that when at its greatest dimensions, it may be from four to six lines in diameter; and that at first its dimensions exceed those of the embryo. Now if it be true that many assertions emitted on this subject are correct, it is not less so, that what M. Lobstein has observed does not prove it to be so; for the ovum of which he has given a drawing being certainly in an unnatural state, all the data resulting from the examination of such a specimen, can be of no weight in science.

Another figure of the umbilical vesicle, in the human species, is annexed to M. Meckel's memoir; but it must be that the drawing is a bad representation of the original, or that the original has undergone some change, for the vitelline sac, the embryo itself, and its envelops are not commonly disposed in that way at the end of the fourth week.

Among all the drawings that have been mentioned by authors, without excepting that of M. Dutrochet, I am acquainted with only two that incontestably represent the umbilical vesicle in its natural state in the first six or eight weeks of pregnancy; they are those of Albinus and Sæmmering, and yet much is wanting, especially to the former, in a great many respects.

438. However, the numerous cases I have collected enable me to affirm that the human ovum always contains, until the eighth week of its growth, a vesicle similar or nearly similar to those noticed by Albinus, Sæmmering, MM. Meckel, Dutrochet, &c.; that if numerous naturalists failed to meet with it, it was because they sought for it in specimens from which it had disappeared, either by the natural progress of pregnancy, or by the rupture of the membranes in the abortion, or in consequence of some morbid state or the decomposition of the parts that enter into the texture of the ovum, or lastly, because they were not sufficiently practised in these sorts of researches always to detect it, though it really existed.

In a total of about one hundred and thirty specimens, examined before the end of the third month, I only met with the umbilical vesicle in a state that could be called natural, thirty times. I have had drawings made of six of these vesicles, and I still possess some that are pretty well preserved in alcohol.

439. The umbilical vesicle is a small pyriform sac of a rounded or spheroidal shape, which about the fifteenth or twentieth day after fecundation is as *large* as a common pea, that is to say from two to four lines in diameter. It probably acquires its greatest

dimensions in the course of the third or fourth week; at least, I have always found it smaller beyond the first month. I confess I never had an opportunity of examining but one before the first fortnight, and that was also smaller. When reduced to the size of a coriander seed, which commonly takes place about the fifth, sixth or seventh week, it generally ceases to diminish, but becomes flattened and then insensibly disappears; sometimes it can no longer be found at the third month, while in other cases it may be met with in abortions of four, five or six months.

440. It is incontestably situated betwixt the chorion and amnios. If I maintained a contrary opinion in 1824, it was because I then confounded it with a vesicular body which to a certain extent resembles it, but which in fact differs very widely from it, as I shall have occasion to show in the sequel.

441. Until the fortieth or fiftieth day it is enclosed in the reticulated body or vitriform layer; after that it unites with, and applies itself either to the internal surface of the chorion or to the outer surface of the amnios. It would seem then that one of these membranes encloses it betwixt its layers; indeed it is most frequently met with thus, though I have found it perfectly free in ova of two and even three months.

442. The characters of the *pedicle* by which it is attached to the embryo vary according to the stage of the pregnancy; until the end of the first month, and in the natural state, I have not found it less than two, nor more than six lines long; at this period of its development it is often a quarter of a line thick, and in becoming confounded with the vesicle undergoes a sort of infundibuliform expansion. Towards the abdomen it does not enlarge, neither does it contract in any sensible degree. Its continuity with the intestinal tube can now no longer be called in question in the human subject. Before the parietes of the abdomen are completely formed, it is divided, as it were, into two portions by the amnios, which it appears to have traversed or perforated. One of these portions is found betwixt the spine and the spot to be subsequently occupied by the umbilicus; the other remains without, between the amnios and the vesicle.

443. After the first month the canal elongates, becomes more and more delicate; its umbilical portion is lost in the cord, and can no more be traced as far as the belly; its length may extend to half an inch, an inch, or even one inch and a half. Whenever I have found the vesicle further than this from the root of the cord, it manifestly depended upon its pedicle having been broken by the tractions naturally exercised upon it by the membranes when these parts acquire an early and pretty strong adherence to each other. Accordingly as this rupture is effected earlier or later, as the adhesions are stronger or weaker, as the pregnancy is more or less advanced, the vitelline sac is found to be more or less remote

from the umbilical cord, or if you please, more or less approximated to the circumference of the placenta.

444. This stem is unquestionably hollow until the twentieth or thirtieth day, for I was able in two specimens to squeeze the liquid from the vesicle into the intestine without rupturing any thing; whence it follows that the objections of MM. Emmert, Hœchstetter, Cuvier, &c., are of no value, at least in so far as they are applicable to man. It becomes obliterated at a period which has not appeared to me to be always the same; in general, however, it may be said to be no longer permeable at five weeks, and its occlusion takes place from the navel towards the vesicle in proportion as the cord becomes more complete.

445. The *parietes* of the vitelline sac are strong, resisting, pretty thick and difficult to lacerate; they have never appeared to me to be more frail than the other membranes of the ovum, unless they had been previously rendered thinner by some morbid change or by some mechanical cause. Smooth and even when the vesicle is full, they wrinkle or fold, on the contrary, when that little body is emptied; they are generally of a yellowish colour, but perhaps this tint depends upon the fluids they contain; their transparency, too, is imperfect, which may depend upon the same cause.

446. Those who have examined the umbilical vesicle in brutes, and who have admitted its continuity with the intestines, pretend that it is composed of *three laminae*. According to M. Dutrochet the same is observable in the human species, but, so far as I know, this is only a mere assertion, advanced without proof. However, as to the vesicle, I have never in any instance found it to consist of several membranes; its pedicle in particular is homogeneous and not lamellated. So that I think we may very well admit in in this apparatus the existence of a mucous surface and a serous surface, but not of a *serous* membrane and a *mucous* membrane; still less of a muscular *coat*: besides, it is not until a much later period of life that these distinctions of the tissues are effected, even in those organs where they are subsequently most decided (166).

447. However this may be, *arterial* and *venous* vessels are visibly distributed upon it; I have observed them not only in the substance of the parietes of the vitello-intestinal canal, but also in those of the vesicle itself; in the latter twice, and more than twenty times in the former. In the former case I saw them compose a very beautiful net-work with arborescent ramifications extremely easy to follow, without any particular preparation, and even with the naked eye. In the latter, they consisted of two trunks becoming larger and larger as they approached towards the abdomen.

448. These vessels, denominated the *omphalo-mesenteric vessels*, would be better named *vitello-mesenteric*, or simply *vitelline*. Ac-

according to my own observation, they do not empty themselves into the superior mesenteric vein and artery; I have always remarked that they join one of the branches of the second or third order of these great vessels, particularly those that proceed to be distributed to the cæcum. I have often traced them in the abdomen, through the umbilical ring, and as far as one, two, and even three inches along the cord, in products of six weeks, and two or three months old. But they disappear at these different periods, and at last are lost in the spongy tissue of the umbilical cord, before arriving at the vesicle. I have several times succeeded in injecting them, and then they appeared of the size of a large hair; in general, however, they are so fine, that they are easily broken if sought for without the greatest care.

449. Inasmuch as I have seen them in an ovule at the same time with the pedicle of the vitelline sac, from which they were perfectly distinct, it appears to me they should henceforth be considered as destined to carry to and take up from the parietes of the vesicle and its canal, the materials that serve for the nutrition of this curious apparatus; and not for the transfer of the vitelline substance into the general circulation.

Many reasons, drawn from analogy, have led to a comparison between the vitelline matter and the yolks or vitelline substance of the eggs of birds. In the largest umbilical vessel I ever saw, and perhaps the only one where there was no possibility of this substance having undergone any change whatever, it was of a very decided pale yellow, consequently opaque, of the consistency of a pretty thick emulsion, and different in all respects from serum or any other known fluid of the economy. In others I have found it more fluid and clearer, and in others yellower and thicker; in several specimens it consisted of one or two small concrete clots, resembling in a remarkable manner the yolk of egg cooked and floating in a slightly coloured fluid; to conclude, its colour is analogous to that exhibited by the parietes of the vesicle itself, after the sixth week of its growth. We ought, consequently, to admit, that it is a nutritious substance, a sort of oil in a great degree similar to that which constitutes the vitelline fluid of the hen's egg.

450. The uses of this apparatus then are evidently connected with the nutrition of the primary lineaments of the fœtus; it furnishes to the embryo its means of growth, until the cord and umbilical vessels are formed, or rather until the ovule becomes exactly applied to the inner surface of the womb; numerous materials then pass from the parts of the woman to those of the ovum, and the umbilical vesicle soon becomes useless. Under this view, the apparatus I am speaking of can be but temporary, and created to the end of giving time to nature to establish, with her accustomed gentleness and regularity, the permanent means of nutrition in the

ova of mammiferous animals. From the moment of fecundation until the ovule is found in immediate contact with the inner surface of the womb, the product of human conception is in almost all respects similar to the egg of a bird: like it, free, and independent of every part of the mother, it must contain whatever is necessary within itself; it must contain a substance, by the expenditure of which the growth of the embryo can be effected, just as the chick must enclose within its shell a material subservient to its evolution. But in one this arrangement is only transient, while in the other it remains until the embryo is hatched: but this difference depends upon this, that in the former, incubation is performed in the interior of a living organ, an organ capable of distributing nutritive matter in abundance to the young product within it; while in the second, it all passes in the open air, outside of the parts of the adult animal.

§ II. OF THE ALLANTOIS.

451. The allantois has by turns been admitted and rejected in the human ovum, from the earliest history of anatomy until our own times, and even now most authors agree in rejecting its existence. All indeed who have described it speak of it merely from analogy, or have mistaken it for an organ with which it is important that it should not be confounded.

M. Lobstein has described the umbilical vesicle itself for the allantois; M. Dutrochet is still farther from the truth in taking for this organ the inorganic pellicle that lines the interior of the membrana caduca. Lacourvée, Hoboken, Diémerbroeck, Hales, Noufville, Littre, Rouhault, &c., affirm that they have observed it at all periods of pregnancy; some have even given drawings of it; but all their observations are referable to a primary error; it is the chorion, confounded anteriorly to their day with the anhistous membrane, that they have described in place of the allantois.

452. In an ovum of about twenty days old, for which I am indebted to the kindness of Dr. Terreux, the space between the amnios and chorion, which was quite considerable, as it should be in the first month of pregnancy, was almost entirely filled by a fungous substance of a brownish-yellow colour, which was less thick the nearer it was observed to the umbilical cord, while it was several lines thick at the point diametrically opposite. Notwithstanding this great thickness, it was impossible for me to divide it into several laminæ; it appeared to be formed of an infinite number of filaments and lamellæ, disposed without regular order, but so as to form a sort of reticulated magma. By pressing upon it with the dissecting needle, I squeezed from it some particles of a whitish pulpy matter; upon detaching it from the chorion, I found it adhered to it by some very delicate and fragile filaments; that its adherence to the amnios and vitelline sac was less regu-

larly established; lastly, that it also enveloped the cord on which the amnios was not as yet folded, and that it could be traced to the belly of the embryo, as far as the pedicle of the umbilical vesicle.

453. It is rare, exceedingly rare, to have an opportunity of examining so perfect a product of conception; M. Henoque, however, procured one for me that was still more so. This ovum, three or four weeks old, and very recent, had undergone no change of shape, nor laceration; immediately under the chorion there was a tissue of a dull white colour, extremely delicate, and almost as easy to tear as the retina. Notwithstanding all the care taken it was ruptured merely by the pressure I made upon another point of the ovum in dividing the chorion. It was full of an emulsive or cream-like substance of a slightly yellowish white, and which tended to escape in homogeneous grumes. Its inner surface gave birth to fibres and lamellæ, and to numberless prolongations which decussated in every direction, like what is observable in the spleen, the seminal gland, the corpora cavernosa, and as is said to be the case, also, in the hyaloid membrane of the eye. These filaments, after traversing the semi-fluid white matter, proceeded to a second lamella, which, without any intermedium, was in contact with the periphery of the amnios, of the umbilical vesicle, and of its pedicle. Certain isolated shreds, being washed and floated, exhibited an almost perfect transparency, and much less thickness than the amnios.

454. To sum up, this new organ constituted a sac with a double coat, moulded upon the cavity of the chorion, enclosing the umbilical vesicle and the amnios, after the manner of the serous membranes, forming interiorly a true net-work with large unequal meshes, in which the emulsive fluid was lodged. Its two coats, separated at one place by a distance of more than three lines, became more and more proximate towards the root of the umbilical cord; near the belly they appeared to be confounded with each other, but their extreme tenuity prevented from ascertaining what organ of the abdomen they were continuous with.

Have I now any right to conclude that this body was really the allantois? It is true I did not succeed in demonstrating its communication with the bladder, but this communication has been no better demonstrated in reptiles, and even in many of the mammiferæ; moreover, the bladder itself was so small, or so little developed in this specimen, that I am not sure of having seen it; besides, as on the one hand the summit of the urinary bladder naturally reaches as far as the umbilicus, and as on the other side I traced the reticulated sac from the root of the cord as far as the navel, it was impossible to make a nearer approach, without reaching it, or without actually demonstrating it, to render this communication more probable.

In embryos more advanced, I have many times traced the urachus into the umbilical cord, where it unravels and is transformed into a porous tissue, and terminates either in one of the swellings when they still exist, or in the gelatinous tissue of the placental stem after passing on for six or eight lines, or one inch, or fifteen lines. I have seen more; in an ovum of five or six weeks old, the prolongation from the bladder proceeded to, and was lost in the vitriform layer, which at this period takes the place of the porous body of the ovule; I must, however, confess, that having blown air into the bladder, I could not make it penetrate into the urachus, which always retained the characters of a solid filament.

455. From the fifth week after conception until the close of pregnancy, there is betwixt the chorion and amnios a transparent stratum, either colourless or of a somewhat greenish red; this stratum, instead of being merely serous, is lamellated after the manner of the vitreous body; it diminishes in thickness in proportion to the development of the other membranes; the quantity of fluid contained in its meshes is, on the contrary, in the inverse ratio of the progress of gestation; by diminishing in thickness, it at length comes to form only a homogeneous pulpy stratum, to transform itself into a simple gelatinous or mucous coating, which, in many women, wholly disappears before the period of delivery; several of its lamellæ are confounded together at the external surface of the amnios, principally in the environs of the root of the umbilical cord; the same thing takes place, but more rarely as to the chorion, which explains why the umbilical vesicle, observed after the sixth week of gestation, is very often united, as if framed in, with the membranes of the chorion and amnios; this matter occupies the place of the reticulated body, and like the latter is continuous with the gelatinous portion of the cord. But is it independent of the porous sac which precedes it; or rather is it only a modification thereof? This last conjecture seems to me to be, if not certainly true, at least extremely probable.

456. In order to acquire more enlarged notions concerning the bodies in question, naturalists may advantageously have recourse to comparative anatomy; for I have found betwixt the allantois of oviparous reptiles, and the reticulated body of the human ovum, the most exact resemblance.

In mammiferæ I have observed, even at the close of gestation, that the urachus, after traversing the umbilical cord, expands into a smooth tissue, that is porous, and, as it were, drilled full of holes, which at last unites intimately with the corresponding surfaces of the membranes between which it is naturally placed. In this cribriform membrane we meet at other periods with certain pelotons of concrete fatty matter, similar to the *hippomanes* of horses; and as

the bladder opens into it, it unquestionably constitutes part of the allantois.

There are, therefore, between the sac known as the *allantois* in the mammiferæ, birds, and reptiles, and the reticulated body which I discovered in the human ovum, the most striking agreement in respect to resemblance and nature.

457. In maintaining that the allantois is designed to contain the urine of the fœtus, naturalists have in all ages relied chiefly upon its communication with the bladder in brutes, upon the saline taste of the fluid met with in it, and, according to Daubenton, on the urinary smell observed in it. I do not think that, even in the viviparous animals, these data are sufficient to establish such an opinion; the urinary odour is a character which is surely too fugacious for us to attach any great importance to it, and on this point is it quite sure that Daubenton was not mistaken? In the second place, what does the salt taste prove? Do we not meet with it in the water of the amnios? Was it not communicated by the last named fluid to the former? What connection can there be between the urine and the viscid, fatty, whitish matter contained in the allantois of the bisulcæ; between the urine and that white, feculent and reticular mass contained in the allantois of the chick about the tenth day of incubation; between the urine and the milky, flaky fluid I have observed in the ovum of an adder? Certainly none: to contain the urine is not the only, is not even the chief use of the allantois.

As to the human species, whether the reticulated body is analogous to the allantois, or constitutes a different organ, whether it communicates with the bladder by means of some channel, or is independent of it, it appears to me impossible to establish the least affinity between the substance found in it and the urinary fluid.

Its functions, like those of the reticulated body, are in my opinion connected with the early nutrition of the germ. Perhaps it serves for the development of some particular organ, or some special apparatus; on this subject, we may indulge in a thousand conjectures; but fearing to stray in the field of supposition, I prefer to wait for new facts. I shall content myself with showing that the inner surface of the shreds I have turned back on it were covered with an adherent layer of a cream-like matter contained in its interior; that, in the microscope, it presented a villous appearance, and that from this double peculiarity it is probable that the substance in the reticulated body is secreted by its own parietes. This, moreover, would be an argument in favour of the opinion of Harvey, of Joerg, and of Oken, in relation to the fluid of the allantois in animals. I will observe further, that this matter preserves its cream-like, flaky aspect, its appearances of an emulsive fluid, its characters of a nutritive substance, until the ovule is well fixed in the womb, and then disappears very rapidly, giving

place to the albuminous stratum, which remains until the termination of pregnancy. I make no mention here of a third vesicle described in the *Isis* by M. Pockels, under the title of the *erythroid vesicle*, because I have never noticed it, and because I believe the author is mistaken in relation to it.

SECTION 3.

Of the Cord and Placenta.

§ I. OF THE UMBILICAL CORD (*funiculus umbilicalis*).

458. The umbilical cord is a stem by which the abdomen of the fœtus is connected with the membranes of the ovum, from the commencement until the end of pregnancy.

459. Its *length*, although variable, is notwithstanding generally the same as, or a little greater or less than that of the fœtus at birth, that is to say, from fifteen to twenty inches. Denman, L'Heritier, and MM. Morlanne and Maygrier, have spoken of cords measuring four, five, and even six feet in length; others have been seen only a few inches long, which even retained the placenta in contact with the fœtus; but these extremes of dimension are rare, and some of the notices of them require to be repeated.

460. Sometimes *thicker*, at others more *slender*, it generally is about the size of the little finger. In this respect its anomalies, which are much more apparent than real, depend upon whether the spongy tissue of which it is partly composed is engorged with fluids which constitute *fat cords*, or on the other hand almost entirely desiccated, and then the cord is *lean*. However, they may also depend upon varieties in the absolute thickness of their vessels or sheaths.

461. Although smooth and polished like the serous membranes, the human cord, nevertheless, exhibits many *nodosities* of different kinds, on which I must dwell for a moment: on some occasions they are real knots, either simple or complex; more frequently, however, they are doublings, vascular nooses, whether of the arteries or of the vein; the former are met with particularly where the cord is very long, are owing to the movements of the fœtus, are effected in the same way as the twisting of the cord about the neck, limbs, or other parts of the child, frequently met with in parturition, and it may be said are but the definite result of this last-mentioned disposition.

The second, known in all ages, are, according to Harvey, more frequently formed by the vein than by the arteries; but according to my own researches and those of Hoboken, more frequently by the arteries than by the vein: being produced by the folding of one or both these vessels, after the manner of the varicose knots in

other parts of the body, there may be only one or several of them on the same cord. Rhodion and Avicenna among the ancients, and the old women of all periods, pretend that by the means of the number of these knots, their remoteness from or nearness to each other, and their colour, it is possible to ascertain the number and sex of the children the woman is to have in future, the interval between each of the confinements, &c. These ridiculous pretensions, begotten by the superstition of our ancestors, doubtless do not deserve to be seriously opposed; but they are so often met with among the public, that I thought they ought not to be passed over in silence. Although they have never been accused of interfering with the omphalo-placental circulation, it may nevertheless be concluded, that if very numerous and close, and presenting very acute angles, these turnings might be the means of obstructing to a greater or less degree the flow of the blood in its proper vessels.

462. The point of the belly which gives insertion to the umbilical cord, is at a greater distance from the breast, or nearer the pubis, in proportion as the pregnancy is less advanced. At birth, it generally corresponds, according to Chaussier and M. Bigeschi, to the middle of the space between the vertex and soles of the feet. It ordinarily terminates in the centre of the placenta; but it is also sometimes found attached very near the circumference of that body: in the former case, the branches of which it is composed diverge by expanding in the covering of the ovum; in the latter, it is not a rare occurrence to find it creeping betwixt the membranes a longer or shorter time before it is lost in the placental parenchyma. Of an equal size throughout its whole extent in some subjects, it is in others much more slender near its root than near the abdomen, and reciprocally.

463. *Development.* Trusting to false analogies, hypothetical data, or careless observations, authors have asserted that it does not begin to be distinct until after the first month of gestation. The youngest embryos I have ever dissected had the umbilical cord. I am now in possession of several of from one fortnight to three weeks old, which are only three or four lines long, and in which the cord is equal to, or even exceeds the length of the fœtus. Relying upon very numerous facts, I think I can establish it as a general rule that the length of the cord is about equal to, or somewhat exceeding that of the fœtus, at all periods of pregnancy.

It is slender and cylindrical until the end of the third week: a little later, from the fourth to the seventh, the eighth, or even the ninth week, it acquires a considerable relative size, exhibits tubercles, vesicles or swellings, which I have nowhere seen described; which are to the number of two, three or four, and separated by the same number of contractions. In the course of

the third it becomes smaller, in consequence of the shrinking away of its swellings; finally, from this period until the termination of pregnancy it ceases to grow in proportion to the other parts of the fœtus.

464. Its *composition* is far from being the same at all stages of its evolution. At the commencement, it really consists only of a small solid cylinder, to which the amnios does not furnish any coat. From the fifth week it contains the duct of the umbilical vesicle, and a portion of the urachus or allantois, and some of the intestines. But about the second month, the alimentary canal has re-entered the abdomen, the urachus, the vitelline duct, and its vessels have become obliterated, so that at three months, as at nine, the umbilical stem is formed only of two arteries, the vein of the same name, of the gelatin of Warthon or spongy tissue of Rouhault, and of the amniotic sheath.

465. Diëmerbroeck, Wrisberg, Schrœger, and Michaelis have admitted the existence of lymphatic vessels in the cord; MM. Chaussier, Dorr, Reuss, &c., think they have discovered nerves in it going to the solar plexus; but it is probable these authors permitted themselves to be imposed on by some remains of the urachus, the vitelline vessels or duct, &c. At least I have never been able with all the pains I could take to verify their assertions; a circumstance in which my researches agree with those of MM. Lobstein and Meckel.

466. Although there is in man only one umbilical vein, as an ordinary rule, cases are cited where there were two, as occurs in a great many of the mammiferæ. In other cases, instead of two arteries, only one is found; I have seen an instance of this sort, and M. Blandin has deposited a second in the Museum of the Faculty.

These vessels are not visible until the first fortnight, or the second month after conception, and do not assume the spiral form until after the disappearance of the swellings of the cord, that is, from the seventh to the eighth week. The reason of this twisted appearance seems to me to be very plain; it depends on the rotatory movements of the child in the womb, and ten times out of twelve it turns from left to right, according to my own and Meckel's observations. In some subjects, the cord is turned in one direction near the placenta, and in the opposite one near the child's belly; most frequently it looks like a real rope, and hence, doubtless, is derived its name, *cord*. Sometimes all three of the vessels turn on one ideal axis; at others the vein is twisted round the arteries, but in general the arteries are twisted round the vein.

467. It is altogether incorrect to say with Hoboken, Reuss and some other anatomists, that there are valves in the umbilical vein; I have been convinced of the contrary a hundred times by careful

dissection. Rouhault has remarked that the dimensions of this vein are double those of both the arteries.

The common sheath that envelops them continues transparent for about two months, and during this period permits us very distinctly to see them in its centre; after which it grows more and more opaque as the pregnancy advances. I have already said that it does not exist at the commencement; it is seen to form by degrees between the first and the end of the second month, progressing from the embryo towards the root of the cord in the following manner: the amnios, at first much smaller than the chorion, and as if pierced with a circular hole, to allow the pedicle of the vitelline sac and umbilical vessels to penetrate into the abdomen, is afterwards reflected along the umbilical cord as the ovum enlarges, but so as not to afford a complete sheath to its vessels until the tunics of the fœtus come in contact with each other.

468. Notwithstanding that these vessels do not in general separate or divide until they reach the placenta, it would be a mistake to suppose they never do so. Their division may take place at the distance of one, two or four inches from the inner surface of the chorion, and even very near the abdomen of the child. In this case their first divisions, diverging like the rays of a parasol, fall upon points pretty near the circumference of the placenta. Examples of this kind have been figured by various authors. I have seen one belonging to M. Deneux, and have two of my own. Those observers, who, like Van-der-Wiel, Schurig, &c., have supposed that a single fœtus might have more than one umbilical cord, have probably been misled by this anomaly, for it is pretty nearly certain that two cords never existed in the same subject.

469. In the scientific collections may be found facts tending to prove that the belly is not the only point to which the cord may be attached; that it has been seen inserted upon the breast, the neck, the limbs, &c. But none of these observations are of a nature to enforce conviction; they should be received with great reserve, for they rather give evidence of the credulity of their authors, than of what they wish to prove. However, there is at Brussels, in the anatomical museum of a gentleman of that city, a fœtus, with a cord inserted upon the cranium, and which M. J. Cloquet has had an opportunity of examining. If I might speak of a thing I had never seen, I should say the abnormal cord originally belonged to a second fœtus, and became accidentally attached to the cranium, that the natural cord also existed, and that the cranial cord did not penetrate beyond the integuments: I have seen one case that might give rise to ideas similar to those I am now combating. A monstrous fœtus, born at the seventh month, and for which I am indebted to the goodness of Madame Jagu, had the umbilical cord so disposed, that at first view there seemed

to be four of them; two of them departing from the belly and the other two from the breast. But it was only a natural cord, doubled several times, and the angles of the folds of which had adhered to the membranes and also to the skin of the fœtus.

§ II. OF THE PLACENTA (*hepar uterinum*).

470. The *placenta*, thus named by Fallopius from its resemblance in shape to a flattened cake, is that part of the ovum which is found in immediate contact with the organs of the mother, and is continuous at its circumference with the reflected *caduca*. It is only found in the mammiferous animals, where it exhibits very various shapes. In the dog it is a complete zone surrounding the entire chorion; the placenta of the ruminating animals is multiple, and presents itself to the view of the observer under the appearance of unequal and pedicillate masses. In the rodentia it is composed of a circular plate formed of two layers, which are to a certain extent dissimilar. In the horse it consists of a simple reddish and granular layer, which covers the whole extent of the chorion. In the human species where I have particularly to examine it, it is a softish and spongy, flattened, circular, oval or reniform body; its width, ordinarily from six to eight inches, is sometimes smaller and at others greater. Its thickness is also very variable, and, moreover, very unequal in different parts of the same one; generally from one inch to an inch and a half at the centre, it goes on lessening towards the circumference, which is frequently only a few lines in thickness, but which is occasionally, in some points, thicker than the centre itself.

As its diameters are from six to eight inches, it is useless to say that its circumference is from eighteen inches to two feet.

471. One of its surfaces, the *fœtal*, *inner*, *smooth*, *vascular*, *membranous*, &c., surface, is lined by the chorion, which adheres to it, and by the amnios, which can always be separated from it by merely peeling it off. In spreading upon it, the principal divisions of the vessels of the cord form a very beautiful diverging net-work.

472. Its other *external* or *uterine* surface, viewed in the womb or upon an entire ovum, appears porous and fungus-like, but even; neither cracks nor orifices of sinuses are seen; it only exhibits a few salient points; the anhistous membrane does not cover it; a simple pellicle lines it and covers its lobes.

When the placenta is out of the womb, this surface is, on the contrary, extremely uneven; lobes of various sizes are seen upon it, and they are separated by fissures of greater or less depth; and this happens because, in detaching and expelling the placenta, the uterus, by doubling up, lacerates the thin inorganic pellicle which concealed the intervals between its numerous cotyledons.

I have had six opportunities of observing it *in situ*, and in none

of them could I discover either sinus or opening having the least resemblance to what authors have described as such. It is probable that the observers have been deceived by some accidental openings and excavations, such as are often met with, but which are owing to the pellicle, before mentioned, being lacerated here and there, and rendering it an easy matter to penetrate into the placental fissures, as into so many excavations.

At the full term of pregnancy, the circumference of the placenta is continuous, without any decided line of demarkation, with the double layer of the caducous membrane; and this is doubtless what has led to the belief that the first-mentioned part of the ovum is only a thickened portion of the latter.

473. Arantius, Hoboken, Warthon, Ruysch, Malpighi, and many other old writers; Wrisberg, Reuss, MM. Lobstein, Meckel, &c., among modern ones, have made many attempts to unveil the *nature or structure* of the placenta. It might be supposed that in this respect science has nothing more to desire; but in turning over the most esteemed works on the subject, one's opinion is soon altered, on perceiving that twenty different sentiments yet have their antagonists and defenders.

Warthon, opposed by Arantius, was one of the first to say that the placenta consists of two halves, one uterine or maternal, and the other membranous or fœtal. If Warthon, and those who have adopted this division of the placenta, have not taken the ovum of the rodentia as their model, I am unable to discover in the human after-birth any appearances that could account for their mistake; which besides has been imitated by many of the moderns.

It is sufficient to cast a glance on the porous surface of any placenta, to be convinced that one of its halves has not remained adherent to the uterus; to remark that this surface is smooth, and covered with a thin lamella, noticed even by those who admit the double layer, in order to see that the fact is not so, and indeed cannot be so, &c.

474. This *membranule*,* which covers the fungous surface of the placenta, admitted by Arantius, Littre, Hunter, MM. Lobstein, Chaussier, Meckel, and most of the modern anatomists, rejected by Ruysch, Mery, Rouhault, &c., seems to me to have been generally ill understood: some, contrary to the opinion of Wrisberg, have thought it to be only a thin portion of the caduca; according to most observers it contains many vessels; many authors state that it passes directly from one lobe of the placenta to another without dipping down into the interval between them; a still greater number, on the contrary, pretend that it dips down, also, between the cotyledons, between each bundle, and every vascular filament, to which it furnishes a kind of sheath. Lastly there are

* It has been called the *placenta serotina*, and is supposed to be formed at a late period and to increase with the increase of the placenta.—M.

some who believe in its existence during the whole period of pregnancy ; while others say they have only met with it in the three or four last months.

As long as the placenta does not form a compact mass, that is, until about the twelfth week, there is not a trace of the pellicle in question ; as soon as the tomentose groups of the chorion become entirely agglomerated, it appears as if to cover their summits, and soon afterwards is found to be continuous and confounded with the reflected edge of the anhistous membrane.

It certainly contains no vessels, and the idea of a circular venous sinus, which according to the reports of certain anatomists exists along the circumference of the placenta, can only be the result of a careless observation.

The utero-placental pellicle is here disposed in the same manner as the arachnoid is on the brain : on the top of the projections and protuberances it adheres intimately ; whilst opposite to the spaces betwixt the lobes it may be easily separated, in the shape of a delicate transparent lamella : like the arachnoid, it also remains on the surface, and in general does not penetrate into the parenchyma. Its nature is similar to that of the pellicles, which soon after their formation cover almost all sorts of fibrinous concretions. It is not a tissue ; it is destroyed by placing it in water, and after a few hours dissolves as readily as all the other membraniform concretions.

475. A coat of *deposit*, much thicker, more fragile, and not so smooth as the preceding one, surrounds all the vascular trunks ; this is what has given occasion to the belief that the vessels of the placenta ramify in the very substance of the *caduca* ; that the chorion is composed of several coats ; that the anhistous membrane lends one lamina to the external and another to the internal surface of the placenta, and that the delicate pellicle of the latter is doubled down between all the fibrillæ of its lobes and lobules. The lamellæ of which it is composed appear to me to be a concreted product of a peculiar exudation from the womb, the chorion, and its tomentose portion. In this respect there is some analogy between them and the *caduca* ; but they differ from it in this, that they are not to be seen until a long time after the ovum has reached the uterus ; while the anhistous sac forms immediately after fecundation ; and also in this, that one is very soft and somewhat elastic, while the others are dry, hard, and break almost as easily as glass.

476. The *glandular* bodies, to which Blancardi, Malpighi, and Littre attributed important functions in the placenta, are no longer admitted by any body to exist ; those anatomists probably allowed themselves to be deceived by the primitive and natural granulations of the chorion. Notwithstanding the assertions of Warthon, Cruikshank, Mascagni, Wrisberg, Michaelis, and Schræger, it is

now pretty generally agreed to deny the existence of *lymphatic* vessels in the after-birth. The same is the case as to the *nerves* which Verheyen, MM. Ribes, Home and Bauer tell us they have seen.

477. However, Dr. Lauth has recently published a work tending to prove that a great number of lymphatic filaments of a peculiar kind pass from the placenta to the uterus. It is true that when we carefully separate the ovum from the womb, we perceive an infinite number of small whitish threads, extremely easy to break; but it is also certain that similar threads are to be seen when separating the *caduca* from the surfaces which it lines, the *amnios* from the *chorion*, &c., that these are merely gelatinous or mucous *tracts*, but not vessels, nerves, nor even cellular filaments.

478. The *blood-vessels*, therefore, compose the fundamental element of the placenta; these vessels are but expansions or ramifications of those of the cord, and like those of the navel-string, are not developed until after the third week, and then by *intussusception* and gradually.

Previously to this period, the villous matter of the chorion does not contain any of them, and this villous portion may until then be compared to the hairy parts of the root of plants. It contains, indeed, spongioles, radicles and articulated filaments analogous to those described by MM. De Candolle, Correa and Dutrochet; if it does take up any fluids from the surrounding parts, it must imbibe or absorb them after the manner of vegetables. At a later period, vascular channels are formed, as happens in new tissues. Being at first much smaller than the radicles with which they are surrounded, they do not seem to extend throughout the whole length of the chorion, even at a pretty advanced period of their growth. I have injected them with coloured alcohol, size, spirits of turpentine, &c., at the third and fourth months, and afterwards examined them with the microscope, and although the injection had passed into vessels finer than those of the choroid, it always stopped at a considerable distance from the extremities of the villous branches. This portion, which cannot be injected, has always appeared to me to be, like the primitive tomentum, unprovided with any central channel, to be of a spongy nature, and to absorb only by means of imbibition.

The bands and solid white filaments that are found in the placenta even after delivery, and which are attached to the chorion, are not, as some cotemporary authors too confidently assert, obliterated vessels: they never were hollow, and remain solid, as they were at the commencement. They are similar to those which connect the reflected portion of the anhistous membrane to the villous coat, and belong to some primitive branches of the villous coat of the ovule, in which no vessels were developed.*

* I maintained this opinion in the year 1823 (*Archiv. Gén. de Méd.*, 1824),

Do the venous capillaries appear before the arterial capillary vessels? Is the contrary the case? The assertions of Bœclard, of Meckel, of Lobstein, &c., concerning this point in anatomy, are any thing but conclusive: having always met with arterial at the same time with venous branches, I am disposed to believe that both these kinds of canals appear together; and how could it be otherwise? If the blood enters in one, must it not return by the other kind of vessels?

Each vascular branch, in separating from the outer surface of the chorion, is composed of a single artery and a single vein, which are already twisted in a spiral manner; the trunk soon divides into two branches of each sort, and these again into two others, so that these dyctomic ramifications go on almost *ad infinitum*: being pressed together and united to each other by means of the fibrous layer, these divisions and subdivisions constitute a lobe, or cotyledon of the placenta. In ruminating animals, particularly in the cow, these lobes being very remotely separated from each other, form so many distinct placentæ.

All the vessels of one lobe communicate with each other; but the experiments of Wrisberg, which I have repeated, prove that they do not in general communicate with those of a neighbouring lobe.

479. When any of these lobes separate from the others, and are at some distance from the placental disc, they form a small distinct placenta, and this has assuredly been the reason which has on more than one occasion led to the belief that there were two placentæ to one single fœtus. Each one unites to those about it, as the different lobules of the same cotyledon are united among themselves, and their adhesion, which takes place in the third month, may easily be broken up at full term: being thus disposed, they constitute the parenchyma of the placenta, so that this parenchyma is entirely composed of vessels, of solid filaments, of granulations, and a fibrinous matter which serves as a common bond of union for them, but not of any cellular basis analogous to that of other organs.

480. MM. Dubois and Biancini state that they have injected the arteries, and probably the veins also, which pass from the uterus to the placenta, and *vice versa*; Reuss has given a drawing of them, and Albinus had already noticed them; I have vainly sought for these *utero-placental vessels* in a great number of sub-

and have ever since continued to inculcate it in my public lectures on midwifery. I am, therefore, not without reason surprised to see MM. Breschet and Raspail, who have confirmed it by some recent microscopical experiments, endeavouring to attribute it to themselves, or refer it to Carus, who never spoke of it before the year 1827; M. Breschet should have recollected, however, that while examining the granulations of the chorion with a lens in his study in February, 1824, we discussed this subject, and that he was not then of my way of thinking.

jects, and the condition of the parts has convinced me that if they do sometimes exist, they are far more frequently wanting. I can assure the reader that, whenever I have examined the ovum in the uterus after the third month, its surface, as well as that of the womb, was smooth throughout its whole extent, and that not a single vessel served to maintain the connection between these two parts.* Might not the learned authors whom I have mentioned have been deceived by some anomaly, some pathological state, or some false appearances? Could I have been mistaken myself? Time and additional facts alone can resolve this question, which I leave for the curious.

Development. Anatomists have all treated of the formation of the placenta; but only a few of them have studied it methodically, even since Hunter made us better acquainted with the nature of the decidua. It has been said, that when the ovule reaches the womb there appear on its external surface certain branching villi which penetrate through the anhistous membrane so as to come in contact with the womb, and that the placenta is formed in this manner; that these villi, at first regularly disseminated over the entire surface of the ovule, soon begin to collect in groups and to assemble together at one point, but becomes everywhere else smooth and transparent; that the placenta cannot be distinguished until after the end of the second month; that it then covers two-thirds or at least one half of the ovum, and that its proportional breadth becomes less and less as the pregnancy advances, &c.

481. The following is an account of what we do observe: after gliding betwixt the inner surface of the womb and the caduca, and becoming attached to the organ destined to contain it until the end of pregnancy, one-half of the villous vesicle is necessarily in contact with it, while the other half pushes away the anhistous membrane. From this moment one disc of the ovule is left in direct contact with the living surface, without the interposition of the deciduous membrane, and here the placenta is developed: this is the only spot in the womb at which the germ can take up the principles of its nutrition, resembling in this respect a vegetable inclosed in a vessel, and having no communication with the earth save by a small opening at the bottom.

It is then evident that the placenta in some sort begins to grow as soon as the ovule reaches the uterus, and not merely after the two first months of gestation; that the relative dimensions of it and the whole ovum are about the same from first to last; and that it is consequently incorrect to say that it covers more than one half of the chorion at the second month, but at a later period

* I have carefully witnessed the anatomical separation of the ovum from the womb at full term, and could never see the smallest vessel passing from one to the other. I do not believe that there is any utero-placental circulation appreciable by the senses.—M.

only a third, a fourth, &c. I have reason to believe that it constantly augments in the same proportion as the surface of the womb with which it is in immediate contact ; so that its width at birth depends upon the size of the uterus or the dimensions of the point left exposed by the decidua at the commencement of gestation.

482. It is well known that the placenta may be attached either to the fundus, the front, the back or sides, and sometimes to the neck of the uterus ; but hitherto the cause of these anomalies has not often been inquired into. Those who say that it attaches itself to the most vascular part of the uterus, make an assertion that is void of sense ; for, admitting that the ovule is at first entirely concealed in the centre of the decidua, as several authors have stated, and still continue to assert, who is to tell that the villi of the womb is more favourably disposed for their reception in one place than in another ? Since observation proves that the villi at first cover the whole vesicle, instead of growing on one portion of it, why should not the placenta occupy more or less regularly the whole superficies of the ovum instead of covering only one-fifth of it ?

Had Osiander, Stein, and some other writers, reflected more carefully upon the subject, they doubtless would not have advanced the opinion that the point of insertion of the placenta depends upon the specific weight of the fecundated ovum, and consequently, on the attitude assumed by the woman immediately after impregnation. Indeed, two remarks suffice to overthrow this system : 1. As the vivified ovule does not leave the tube for eight days, it is manifest that until then, the attitude of the woman is a matter of indifference as to the point in question ; 2. Be the time what it may that is considered necessary for the germ to pass from the ovary to the womb, it is clear that it will find the woman on foot more frequently than in any other posture, and if the idea of Osiander were correct, that the implantation of the placenta over the cervix, instead of being very rare, ought on the contrary to be the commonest of all.

483. I think I have discovered a much more natural explanation of this phenomenon, and shall venture to submit it to the examination of naturalists ; upon entering the womb, the ovule necessarily meets with the anhistous sac, and can proceed no farther without detaching it ; now, if the adhesion of this sac is the same throughout, the vesicle follows its original direction, glides along the fundus of the womb, which, with the assistance of the decidua, seems to prolong the channel of the tube to that of the opposite one, or else it stops as soon as it issues from the tube, and then the placenta attaches itself to one of the angles of the uterus. If the adhesion is stronger above than it is below, we may conceive that the ovum will descend more or less towards the

cervix; if the adhesion be strongest in front, it will be directed backwards, and so of the other points. This hypothesis is further confirmed by direct observation; of thirty-four women who died while pregnant, or soon after delivery, at the *Hospital de Perfectionnement*, I found upon examining the parts, that the centre of the placenta corresponded to the orifice of the tube in twenty cases; it was in front of it in three cases, behind it in two, below it in three, and in six cases only, towards the front of the uterus.

The *mode of union* betwixt the placenta and the womb is another point that has occupied much of the attention of physiologists: Noorthwyck, Astruc, Haller, Mery, and Baudelocque, thought that the large venous trunks of the womb were uninterruptedly continuous with those of the placenta.

Warthon, Reuss and a great many of the moderns suppose that the part of the womb which is in contact with the ovum at the commencement of gestation becomes fungous; that these fungosities, which constitute the uterine placenta, intermingle and unite with those of the chorion, from which arises an intimate adherence, which the womb must tear off before it can expel the after-birth.

It even appears that Professor Dubois argues from this rupture that the milk fever is really a traumatic fever.

According to Stein the lobes of the placenta are impressed into the womb like a seal into soft sealing-wax, and the ramifications of its vessels are implanted into the largest vessels of the womb, pretty much as the roots of a shrub are implanted into the earth. Asdrubali thinks that the placenta adheres to the womb in the same manner as the pulp of a peach clings to the stone. Leroux maintained that it is in the same way as a leech attaches itself to the skin; others have said that it is like the graft of a tree, that it is effected by means of an accidental cellular tissue, of peculiar vessels, &c. &c.

484. It appears to me that what I have said above concerning the structure of the external surface of the placenta, proves that none of these hypotheses are rigorously correct. I may repeat with Madame Boivin, that in several women who died whilst pregnant, the membrane which covers and unites the lobes of the placenta appeared to me to be the only bond between it and the womb. I have remarked, further, that the adherence of the ovum was the same everywhere, that it may be destroyed with the handle of a scalpel without the least difficulty, and without rupturing any thing save some mucous tracts like those found between the amnios and chorion, between the croup membrane and the membrane that secreted it. The error of the authors upon this subject manifestly depends upon their having but few opportunities of examining the ovum in the womb, and especially upon this: viz., that in women who die a few days after delivery, the

internal surface of the last-named organ remains swelled and fungus-like at the part that corresponded to the placenta.

485. *Double ova.* After what I have said heretofore of the different parts of the ovum, I may dispense with entering into any considerable details relative to double pregnancy. If two ovules reach the womb, each by a different tube, or if they attach themselves to it at a certain distance from each other, they will each have a distinct placenta, chorion and amnios, and sometimes even an epichorion, until a certain stage of the gestation. If, on the contrary, they had already contracted some adhesion together previously to leaving the Fallopian tube, or if they happen to remain very near each other in the uterus, it may be that they shall be enclosed in one single leaf of the decidua, and that their villi, as well as their chorion, shall be early confounded together. In this case it may be that the septum formed by their conjunction, shall give way, and cause the two fœtuses to be found enclosed at birth in one single bag of membranes, numerous instances of which are related in the scientific collections, and of which one of the most authentic has been recently laid before the public by Madame Boivin. Nevertheless, such a circumstance is of very rare occurrence, for in double after-births, I have always succeeded in tracing the chorion and amnios to the intermediate septum, where the two membranes were more or less promptly confounded, and in a more or less intimate degree. In general, the vessels of the two placentaë do not communicate with each other, any more than the vessels of the different lobes of the same placenta; but it is easily conceived that the contrary may take place sometimes, as seems to be demonstrated by facts carefully examined.

ARTICLE II.

OF THE FŒTUS.

486. The ancients retained the name *γυνή*, seed, for the product of conception for the first six days. During the next nine days they called it *εμβρυον*, then embryo for twelve days, after which they made use of the term *αιδιον*, to designate the fœtus until the forty-fifth day, and these four supposed periods were characterized by them in the two following verses:

Sex in lacte dies, ter sunt in sanguine terni,
Bis seni carnem, ter seni membra figurant.

At present it is generally agreed to give to the germ, when without its membranes, the name of *embryo*, until the third month of pregnancy; or according to some, until its several parts can be

distinguished from each other; it is afterwards called *fœtus* as long as it remains in the womb, and the term *child* is not applied to it until after its birth. Although this division is entirely arbitrary and difficult to justify, I feel bound partially to conform to it in this work.

SECTION 1.

Development of the Embryo and of the Fœtus.

487. The period at which the embryo first appears in the uterus is still enveloped in darkness, and vain attempts have for twenty centuries been made to penetrate the mystery with which it is surrounded. At the sixth day, says Hippocrates, the semen is changed into a transparent bubble, in which a very small point appears, which is probably the navel. According to Haller and most of his pupils, the embryo is not perceptible until the fifteenth or twentieth day. Of those authors, who, with the ancients, suppose that fecundation takes place in the womb, a part maintain that the embryo is formed first, and the membranes afterwards; others, with Hippocrates, Maupertuis, de Buffon, &c., teach that the membranes, on the contrary, appear first; yet no one has succeeded in showing on what day the embryo begins to be visible. Again, the ovarists and animalculists are in the first place far from agreeing with each other; and we cannot perceive that the proofs they adduce in support of their assertions are much more satisfactory than those of the partisans of the ancient hypothesis. Finally, the opinion of Haller, which had been generally adopted as the most probable, has been lately very much shaken by the publication of a fact which has been supposed to be of a nature to dissipate every uncertainty; I allude to the case recently made public by Messieurs Home and Bauer at London.

However, the sensation produced in the scientific world by this case, seems to me as extraordinary as it is difficult of comprehension, and can only be explained by the urgent desire that is felt to escape from the uncertainty that still prevails in science upon this interesting point in natural history.

What! shall we dare to conclude, because a servant girl returns sick to her master's house, and eight days afterwards dies with convulsions and delirium, that she became pregnant the day she went out? Because the sexual organs of a woman whose menses are suppressed are not in a natural state, it is thought possible to assert that she was pregnant! Further, even admitting this last point, which certainly proves nothing, what right have we to maintain that the corpuscle which was found in the midst of a mass of coagulable lymph, was a germ rather than any thing else?

Let those who feel interested in this subject, take the trouble to examine Mr. Home's note and the accompanying plate, (*Philos. Trans.*, 1817, page 252;) let them weigh all the circumstances, and then say whether such men as Béclard and M. F. Meckel ought to modify their opinions upon such a case.

488. The experiments of R. de Graaf and Nuck, repeated by Duverney, Haighton and Cruikshank, if they are accurate, have long since demonstrated that the product of fecundation in animals is a vesicle, and that this vesicle takes up some days at least to pass from the ovary to the womb. It is true we are ignorant whether the time that elapses between the vivification of the germ and its arrival in the womb is always the same in the same animal, or whether there is any fixed and certain time for the different species; but it appears that this term is three days in rabbits, and according to MM. Prevost and Dumas, who have lately made numerous researches on the subject, that it is from six to seven days in the bitch.

489. Strato, as Macrobius informs us, supposed that the fœtus does not begin to assume the human form until about the thirty-fifth day, when it is as large as a bee. Aristotle teaches that at forty days the embryo is of the size of a large ant; and that we can distinguish its limbs and all its parts, even the penis, if it be a male. It has been stated by others, but less correctly, that from the fifteenth to the twentieth day the embryo is vermiform, oblong, or tumid in the middle. M. Orfila, in speaking of the primitive state of the fœtus, is very wide of the truth. The same may be said of M. Meckel when he asserts "that the part that first appears corresponds almost exclusively to the trunk; that we only remark at its upper part a small projection, separated from the rest by a notch, and whose thickness is not near equal to that of the middle portion of the body; that the embryo is almost entirely straight," &c. Ph. Béclard, by reproducing the ideas of the celebrated German anatomist, has fallen into the same mistake; nor has M. Adelon been more fortunate in admitting that the embryo exhibits no traces of a head at three weeks, and that the belly appears under the form of a conical projection resting on the inner membrane of the ovum. Nor do I understand why Madame Boivin affirms that "at the tenth day, the embryo is merely a grayish semi-transparent flake, easily liquefied, and of a form difficult to determine." It is also certain that when comparing it to a lettuce seed, or grain of barley, as Burton did, or even to the *malleus* of the ear like Baudelocque, they could have had before them only preternatural specimens.

§ I. OF THE EMBRYO IN GENERAL.

Previously to the end of the first week, there is a striking resemblance between the human embryo and that of some of the

serpents, putting aside the proportional length. It is a curved body, forming nearly a complete circle, which in this state may be two or three lines in diameter, but which, if straight, would be at least four or five. It may be compared to some of the animalcules figured by MM. Prevost and Dumas, particularly to the animalcule of the dog; that is to say, one of its extremities is bulbous and rounded, and the other terminates in a point: which gave rise to a belief in the existence of a primitive tail in the human species. Being hollow and semi-transparent, this stock seems to be filled with a limpid fluid, in the centre of which may be seen, even with the naked eye, an opaque filament, of a white or yellowish tint, which represents the cerebro-spinal system.

490. Numerous observations made on very young embryos seem to me to prove: that the rachis is the fundamental part of the body; that it appears previously to any of the other organs; that for a considerable time it exists alone; that its form does not essentially differ from that which it possesses during the remainder of its intra-uterine life; that for twenty days, or a little longer, the embryo is neither straight nor enlarged in the middle; that the head and neck constitute at least one half of its total length; that the younger it is, the more does its curve approach to the form of a circle; that the appearances of its external circumference differ very little at first from what they are at a subsequent period, while its interior *contour* or concavity merits the most serious attention, on account of the changes it must undergo.

491. In fact, the organs appear in succession upon this concave surface; at first the different parts of the face, then the limbs, and between these latter the thoracic and abdominal viscera. Nothing is so admirable as this development; it might be called a real vegetation; the lower jaw, the members, the mass that is to occupy the abdomen and the breast, increase and come forwards, like buds springing from the branch of a tree, or *axillæ* of a plant.

The spinal circle thus fills up by degrees, the forehead becomes farther removed from the coccyx; the thoracic and abdominal portions of the original stock are forced to become straighter; the head remains constantly inclined upon the breast, but in such a way, however, that the chin at last takes the situation previously occupied by the forehead. The coccyx does not retire backwards until a very late period; it is moved in that direction by an extremely simple mechanism; to wit, the development of the pelvis and lower extremities.

492. From seeing that the lateral and anterior portions of the body do not become manifest for a considerable length of time after the vertebral frame, I have more than once been tempted to believe, with MM. Tiedemann and Meckel, Serres and Geoffroi St. Hilaire, that the organic evolution really takes place from the sides towards the median line, and with M. Richerand, to say

that the embryo is at first only a groove, the edges of which vegetating from behind forwards, can only unite by a species of suture upon the anterior median line. But attentive and frequently repeated observation compelled me to abandon this hypothesis; in the median line of the face and neck I never could discover any void; I have found it to be as completely closed at the twentieth as at the sixtieth day; nor have I even seen the thoracic organs entirely exposed, although the mass from which they grow seems to be covered, as far as the belly is concerned, only with a very delicate tissue; the parietes of the chest, nevertheless, exhibit their natural appearances as soon as they can be discovered.

§ II. OF THE HEAD AND ORGANS OF THE SENSES.

At the beginning the *head* resembles a very long club; its subsequent growth is proportioned to that of the rachis; but the appearance of the abdomen and thorax soon occasions it to lose a portion of its apparently enormous size. As neither the face nor chest exists at first, there is in fact no neck at the commencement of embryo life. At five weeks the face is very distinct from the cranium, and the head, quite isolated, no longer resembles a mere pyriform enlargement; and its cranial portion also permits us, most commonly, to discern in the vesicle which it constitutes, the general arrangement of the encephalon. Its facial portion is already quite opaque.

493. *The mouth.* The mouth is the first organ of the senses that can be perceived: I have found it in the youngest embryos that have fallen under my notice; consequently, it exists at the twentieth day, and then forms a very large, elliptical or triangular opening; as the upper jaw is very projecting, while the lower one, on the contrary, is very short, it follows that the mouth of a human embryo bears a striking resemblance to that of a young snake. Anatomists have never altered the ideas they had formed as to the manner in which the lower lip is constituted; they have all supposed that it was primitively composed of two lateral portions, which at length united at a middle line, like the two bony pieces which support it; but it is not so with the upper lip. As long as it was thought that the upper jaw consisted only of two pieces, it was supposed that the corresponding lip must be also formed of only two pieces. But since an intermaxillary bone has been discovered in the human skeleton, it is generally agreed that the lip is formed of three portions, one middle tubercle and two lateral parts, which by their union give birth to the two columns, or naso-labial ridges. This is the theory upon which modern writers account for the formation of simple or double hare-lip, which according to them, should never be met with exactly in the middle of the lip; finally, still improving upon these divisions which

are already too numerous, it has recently been asserted that the upper lip is developed from four separate points. I think I may venture to affirm, that such ideas could only have arisen from observations not attentively made, or too rarely repeated. In the course of the period I am now examining, the lower lip begins to be perceptible; the chin causes the middle of it to project forwards; but its loose edge, which is pretty thin, is not interrupted by any slit, and represents a very regular semicircle; it is longer, and has a deeper curve than the other; but in embryos of six weeks, and in some a little above twenty days old, I have found the edges of both lips perfectly formed, and without any division whatever.

494. *The nose.* It is incorrect to say that the organ of smell cannot be recognized until towards the sixth or eighth week. At thirty days it is often in our power to distinguish its anterior openings, which are round, situated immediately above the mouth, look directly forwards, and resemble two blackish spots. However, neither the nasal protuberance properly so called, nor the naso-palatine vault exists as yet. It is true, nevertheless, that, in several embryos of from five to seven weeks, the orifices of the nose were not very evident to me, while a very decided eminence already occupied its place.

495. *The eyes.* The organs of vision appear at the same time with the mouth if not earlier. I have distinguished them in embryos not exceeding four lines in length, and they are never sought for in vain in the course of the fourth week. At this period its structure is surprisingly simple, if compared to what it must become at a later period. Without lids, canthi, or lachrymal apparatus, resembling a circular disc half a line in diameter, and slightly convex, the visual bulb is separated from the surface only by a slight, superficial and very narrow groove, which can only be found by searching for it with a needle. Two spots seem to constitute it entirely: one of a yellowish-white composes the centre; the other, of a black colour, exhibits the appearance of a circle, on the one hand enclosing the former, and on the other continuous with the integuments. The central spot is at first much larger than the black circle that surrounds it, but in general the latter seems to me to exceed the former in size towards the end of the sixth week. The whole indubitably represents the sclerotica, and the transparent cornea, which is still completely opaque, and seems not to differ from the nails, except in regard to colour. It might in fact be called a portion of skin or epidermis that becomes modified according to the wants of the system. Far from being directed in front during this period, the eyes are, on the contrary, turned very much to the sides of the head, as is the case in a majority of quadrupeds. I have no need to say that they are neither separated nor surrounded by any projecting portion of the

face, for the orbital arches and root of the nose are not as yet apparent.

496. *The ears.* The ear also appears very early; it is distinguishable on the thirtieth day at the latest, and undergoes no remarkable changes until the sixth or seventh week; at first it looks like the simple orifice of a cutaneous follicle, or a shallow and narrow pyramidal depression; some days later it might be mistaken at a first glance for a leech bite, excepting that it has four angles instead of only three. There is no trace nor rudiment of the auricula; its opening is on a level with the skin, and like the eye, the organ of hearing appears to be only a modification of a point on the tegumentary surface; from the fifth to the sixth week the inner angles of this crucial or rhomboidal depression begin to rise above the level of the skin; the tragus appears first, then the anti-tragus, and after that the rest of the concha. All these parts grow by a sort of eccentric vegetation; and it is some time before they incline towards the head, and dispose themselves in regular order.

§ III. OF THE MEMBERS, AND LOWER PARTS OF THE TRUNK.

I have in vain endeavoured to learn which of the members appears first. Whenever I have been able to distinguish the thoracic appendages, the pelvic extremities were equally visible. Neither have I found in their dimensions such great disproportions as are mentioned by authors: at first there is only a small interval betwixt them; the former emerge from the anterior part of the lateral bands of the spinal trunk, at about an equal distance from the top of the head and the point of the coccyx, supposing the embryo to be straightened out; the latter are seen about one line above the coccyx, which is curved from behind forwards, and concealed as it were in the space between them.

As long as none of the abdominal or thoracic organs are yet developed, they are not so near to the convex as to the concave surface of the spinal circle; but the roots of them seem to be farther backwards, as we pass farther and farther beyond the fourth week.

The hand is seen first in the shape of a sort of pallet with a loose and thin but undivided edge; the foot does not sensibly differ from it; these two parts have a slightly concave surface, which is turned towards the median line; their edges, which are somewhat inclined towards each other, look chiefly in a forward direction.

497. From the thirtieth to the fortieth day the forearm and the leg are visible, and the points of the fingers begin to emerge. At forty-five or fifty days the elbow and arm begin to detach themselves from the breast to which they had been before attached

by means of a membrane. The heel and knee also become evident; nevertheless, the thigh appears very short, as well as the arm, which doubtless depends upon its not being as yet completely detached from the sides of the abdomen. All the fingers are very distinct, and the gelatinous substance which unites their base no longer extends as far as their ends; the foot ceases to resemble the hand; the toes are arranged differently from the fingers; in one word, these two organs exhibit nearly the same characteristic appearances they are to have at birth. It is manifest that one is designed for the purpose of standing, and the other to be used for the prehension of objects. This peculiarity alone might serve completely to expose the absurdity of those sophists who have insisted that the primitive mode of walking, in man, was similar to that of brutes.

498. *Coccyx and genitals.* From the foregoing it will have been seen, that during the three first weeks the trunk terminates by a vermiform extremity, and this sort of sacro-coccygeal tail, which is bent very much forward, becomes straighter as its cavity becomes more filled up. I ought here to remark, that its edges soon become continuous with the abdominal mass, or are concealed by the roots of the pelvic extremities. The space between it, the insertion of the umbilical cord and the feet, the extent of which, until the fifth or sixth week, scarcely exceeds a line or a line and a half, retains for a considerable time the appearance of an excavation; it is subsequently filled by the gradual growth of the genito-urinary organs; and the development or concentric increase of the abdominal parietes and sides of the coccyx and sacrum at last completes it.

499. Towards the fortieth or forty-fifth day a black point is distinguishable in front of the coccyx, and indicates the situation of the anus; a little more towards the umbilicus may be seen a conical tubercle, with a groove on its inferior part, constituting the rudiment of the clitoris, or penis, according to the sex of the fœtus. A slit which is of sometimes greater and sometimes less breadth and depth extends from one of these points to the other. In several instances, however, I have thought that the intervening space in well-formed embryos was smooth; so that, up to its period, there is nothing to point out the difference between the sexes: we are tempted to suppose that every fœtus belongs to the male sex, for there is in fact neither labia nor scrotum, and the sub-pubic prolongation is alike in all specimens.

500. *The umbilicus.* Properly speaking, there is no navel until the thirtieth or fortieth day, and the cord merely proceeds to be lost beneath the visceral mass of the abdomen. However, the parietes of the abdomen, gradually increasing towards the omphalo-placental stem, soon afterwards give birth to it.

501. After the sixth week, or the fiftieth day, the organization

of the embryo becomes rapidly perfected. The *eyes* become more convex; a very distinct palpebral circle soon afterwards surrounds them; the two extremes of the vertical diameter of this circle, by gradually approaching each other, soon give it the form of an ellipse, and thenceforth the two angles of the eye are observed to exist. In nine or ten weeks at latest, the edges of the eyelids are in contact, and so closely in some specimens, that several authors have supposed that adhesion had taken place between them. Previously to coming in contact they were thin and sharp; but their thickness now exceeds that of the eyelids themselves; they completely cover the front of the eye, but are so transparent that its colour may be easily distinguished through them. The central spot before mentioned grows yellow and enlarges; one is easily convinced that it constitutes the cornea, and that its posterior surface is in contact with a substance of the same colour. The blackish circle is also enlarged, and being extended farther backwards, is found to belong to the sclerotica, and that its tint depends upon the substance that lines it internally.

502. The *nose*, particularly, undergoes remarkable alterations: the protuberance which it forms above the lip, increasing by degrees, forces its anterior opening to incline gradually downwards. Its internal surface, which until the fifth week composes a part of the buccal cavity, begins in the course of the sixth to be separated from it.

503. The *mouth* does not undergo any essential change; its depth increases; the tongue grows larger and thinner, the lower jaw projects more, which renders the anterior cervical notch more manifest; the lips are more distinct, more isolated, but their form is the same.

504. The external *ear*, reduced to the appearance of a leech bite, in an embryo of four or five weeks, soon acquires its proper characters. Every part of its concha is unfolded. After the tragus and anti-tragus, we observe the slit of the helix to appear, and consequently the concha. The lobule soon manifests itself as well as the rest of the helix, with which it is continuous; and lastly, the anti-helix itself is visible as early as the seventieth day. Although all these parts are formed behind the meatus auditorius, the ear nevertheless seems to extend forwards during this whole period, and to approach much nearer to the angles of the mouth and eyes.

505. The *members* very early reach the form of their perfect state; in eight or nine weeks the fingers are all separate, or only adhere to each other by a transparent gelatinous substance; their three phalanges are distinguishable, and tend already to bend towards the palmar surface of the hand; the last phalanx exhibits upon its dorsal surface a spot which must be considered as the rudiment of the nail; certain opaque lines indicate the situations

to be occupied by the bones of the metacarpus. The proportional length of the arm and thigh, as respects the forearm and leg, is no longer extraordinary. The germ of the shoulder and hip cannot be overlooked.

506. The *coccygeal* point is more completely concealed by the pelvic members, and projects less than it does a fortnight later. The anus ceases to exhibit the appearance of a blackish depressed spot; at sixty days it forms a small conical projection, not perforated, and of a more or less intense yellow colour. The genital tubercle continues to increase in length, and its base is surrounded by a very thick cushion; at some distance from its extremity is seen a circular groove which corresponds to the corona of the glans. The channel along its inferior surface is in a great many embryos entirely shut, but in some it is still prolonged in the form of a slit to within one line of the anal tubercle. The development of the perineum, of the pelvis, and hypogastrium, occasions the cord which in the first period appeared to be inserted betwixt the roots of the inferior extremities very near the coccyx, to remove to a considerable distance from those parts, as it approaches nearer to the centre of the abdominal protuberance. The circle of the umbilicus at last unites so intimately with the cord which passes through it, that there is no longer any line of demarkation between the teguments of the one and the membranous sheath of the other. Then if, as until birth, the size of the belly appears to be enormous, it must be attributed in part to the circumstance that the organs contained in the pelvis on the one hand, and in the thorax on the other, do not attain their perfect development until a very late period.

507. *Dimensions of the fœtus at different stages of pregnancy.* As the embryo is curved forwards while it remains loose in the centre of the ovum, it seems to me that it ought always to be placed in this situation when we go about to measure its length. How can we otherwise obtain determinate results? If, during the first six weeks, we should attempt to straighten it out for the purpose of measuring the distance from the vertex to the os coccygis, the front of the neck and the abdomen would rarely fail to be lacerated; at two months the firmness of the parts mostly enables us to avoid such an accident, but as the fœtus may be either more or less straight, there will arise numerous discrepancies in the results. The habitually flexed state of the lower extremities renders it too difficult to extend them so as to comprise their length in a rigorous admeasurement of the embryo.

Authors not having informed us which of these methods they adopted, it is useless to look further for the reasons of the discrepancy observable in their accounts of this subject. It is true that the most minute precautions will not permit us to specify within one line, the length of a fœtus more than a month old; but happily,

such a degree of precision can be a matter of small moment in the eyes of the observer. In the present instance, the measurements that I shall point out must in general be understood, as applying to the fœtus in its naturally curved position, that is, the space extending from the occiput to the coccyx; and I believe this diameter never exceeds eighteen or twenty lines before the end of the second month.

508. The *skin* of the human embryo has no real existence until at a pretty advanced period of its growth, while the sort of circle which it at first constitutes, is nothing more than a homogeneous gelatinous substance of slight consistency; the epidermis cannot be distinguished from the skin until after the second month.

509. At *three months* the teguments are distinct, but still gelatinous and of a rose colour. The eyelids and mouth remain shut, the nose is very projecting, the head very large; the costal arches and bones of the forearm are visible through the transparent substances in which they are enclosed. The fingers and toes are perfectly distinct, and covered on the dorsal surface of their extremities with a reddish plate which possesses the shape of the nail; from the vertex to the coccyx the fœtus is three inches in length.

510. At *four months* the skin is much firmer, and at certain points is furnished with adipose granulations. The head begins to be covered with down; the scrotum, or the greater and lesser labia are formed; the anus is open; and if in the measurement we comprise the lower extremities, which, notwithstanding the common opinion to the contrary, are as long as the thoracic members, the fœtus will be from five to six inches in length.

511. At *five months* a little down and some particles of sebaceous matter are observable upon various portions of the skin; the hairs begin to grow, but are still white, or without any determinate colour. The teguments are less transparent, although still of a rose colour, and but slightly extensible; the nails are evident; the umbilical cord far removed from the penis or clitoris. No pupil can be distinguished, and the fœtus is from six to seven inches long.

512. At *six months*, the period of *viabilité*, the down and the sebaceous deposit are visible, at least in the axillæ and groins. The hairs of the head may be easily distinguished from those that grow upon other parts of the body; the eyelids are no longer transparent; it has been said that there is at this period no pupil; but it has appeared to me, on the contrary, to be extremely large; the xiphoid cartilage occupies the middle of the great axis of the fœtus, whose whole length is from eight to nine inches.

513. At *seven months* the hair is longer, and not so pale, the down and cutaneous inditus more generally diffused; the skin is less coloured; the nails are large; the membrana pupillaris bursts,

according to the authors ; but it is by no means certain that this membrane really exists in the manner usually understood : I have reason to think that the iris originates at first as a simple ring, which grows concentrically, so as at least to leave the opening commonly called pupil or apple of the eye. The *navel* is still below the middle of the fœtus ; the external genital organs are all apparent, except the testicles in the male, and the fœtus is about ten inches long.

514. At *eight months* the fœtus is only distinguished by its greater maturity ; its length is about eleven inches. Its hair is more or less coloured ; its skin, covered with sebaceous matter and down, is thick, and not so smooth as before ; the lower jaw, which at first was very short, is now almost as long as the upper one, and the nails exhibit a certain degree of consistency.

515. *At term.* The development and weight of a well-formed fœtus, at term, are far from being alike in all cases. The knowledge of them, however, even if approximative, is so important in the practice of midwifery, that their extremes and average ought to be sought for with great care. At this period, the length of the occipito-coccygeal diameter is twelve inches, but the average length of a fœtus straightened out and taken from the heel to the vertex, is eighteen inches,* according to the very multiplied experiments of Professor Chaussier ; sixteen, seventeen, nineteen, twenty, and even twenty-two inches, are also pretty common measurements, but it is rare to meet with only twelve inches, or to find twenty-three. The instances of children twenty-six, twenty-eight, thirty, and even thirty-six inches in length, or of only ten, eight, or even six inches, which we find in old scientific collections, instances which the common people always receive with cordiality, may be boldly classed among other popular stories.

516. The weight of the fœtus is generally six pounds, frequently six and a half or seven, sometimes eight, and rarely nine or ten pounds. Among four thousand children, born at the Maternité at Paris in a given time, Madame Lachapelle never met with one weighing as much as twelve pounds. Baudelocque, who had a case where the child weighed twelve pounds and three quarters, maintains that it is incredible that a larger one was ever seen ; the weight of the child also, according to Chaussier, is frequently only five, four, and sometimes three, or two and a half pounds ; but in the latter instances, it seems to me evident that pregnancy had not reached its full term.

517. Out of the profession, we daily hear of children weighing fifteen, eighteen, twenty, twenty-five, and even thirty pounds at birth : those stories, too, which may be found in many authors of the sixteenth, seventeenth, and even of the eighteenth century,

* The average length of children born in Philadelphia is from 18 to 22 inches.—H.

are owing to the fact, that persons who will not take the trouble to weigh such children, very easily attribute a weight of twelve or fifteen pounds to children that actually weigh only seven or eight. In fact, a new-born child of eight or nine pounds is enormous; the persons surrounding the lying-in woman, when they see such an one, rarely fail to cry out that it is a child of twelve or fifteen pounds; and it is very likely that, in order to render the fact still more curious, four or five pounds will be added to its weight after the fifth or sixth repetition of the story. In order to reduce such fables, which are founded upon gross errors of observation, to their real value, it is only necessary to reflect that thirty pounds is the weight of children of from two to three years of age.*

518. If the absolute length of the fœtus is subject to such great varieties, it is easy to conceive that the relative length of different parts of it cannot be more precise and determinate. Nevertheless, we are sometimes obliged in medical jurisprudence to have recourse to it in order to determine the age of a given fœtus. According to Chaussier, taking eighteen inches as a mean term, there are ten inches and four lines from the vertex to the navel, and seven inches eight lines from the navel to the sole of the foot; eleven inches nine lines from the pubis to the vertex; six inches three lines from the pubis to the sole of the foot; two inches three lines from the clavicle to the lower end of the sternum, and six inches from the extremity of the sternum to the pubis. From the top of one acromion to the other we find four inches and a half, which may be easily reduced to three inches and a half by squeezing the shoulders together. The greatest antero-posterior thickness of the thorax is four inches and a half, while there are only three inches from one crista of the ilium to the other.

§ IV. OF THE FÆTAL HEAD AT TERM.

519. The head, being of all parts of the fœtus the largest and most incompressible, ought to be studied with the most particular care. The bones of which it is composed, its articulations, its diameters, its motions, and the degree of reduction it is susceptible of, ought to be perfectly known to the practitioner who desires not to be more dangerous than useful in applying the assistance of the art to cases of dystocia. It is composed, as in the adult, of the cranium, which is its most interesting part, and of the face, which is as yet but little developed, and whose pieces consist of the ossa nasi, the ossa malarum, the ossa maxillaria

* Nevertheless, I beg leave to affirm, that new-born children weighing 10 pounds are by no means rare in the United States. I have weighed many at 11½ pounds and several at 12 pounds. A few years since a lady in this city gave birth to a child of 13½ pounds, carefully weighed by me. She died a few days afterwards with puerperal fever. I have already noted a case of twins the sum of whose weight was 16½ pounds.—M.

superiora, the ossa unguis, the ossa palati, the ossa spongiosa inferiora, the vomer, and the os maxillare.

520. *Form.* The head of the fœtus, chiefly remarkable from the flexibility of its vault, exhibits in its *ensemble* the form of an oval, the attitude of which has occasioned a sort of literary quarrel between MM. Capuron and Van Solingen: the former of these authors insists that the large extremity of the head is turned backwards, while the latter, who is also followed by M. Dugès, places it, on the contrary, in front. If the external occipital protuberance occupies the centre of the strait in labour, it is difficult not to agree with the Dutch accoucheur, that the large extremity of the oval is represented by the face; but when we take hold of the head by the chin its large extremity is undoubtedly to be found posteriorly. In this case, as in many others, the dispute is rather about words than things; both sides are right, and both are wrong in some respects. However, by reflecting that all the diameters of the posterior part of the head are three inches and a half in length, while the longest of those of the face is only three inches at most, it will be evident that we ought to adopt the opinion of our countryman, and say that the large extremity of the fœtal head is formed by the occiput.

521. *Diameters.* The axes or diameters of the head are imaginary lines, which pass through it in determinate directions. They may be multiplied *ad infinitum*; but those only that are liable to be placed in certain relations to the axes or diameters of the pelvis, deserve our attention. I think that it is sufficient to describe seven: * 1. The *occipito-mental*, five inches in length, extending from the most projecting part of the occiput to the point of the chin, also called the great or oblique diameter, and which M. Flamant denominates the sur-occipito-mental; 2. The *occipito-frontal*, about four inches long, which extends from the occipital protuberance to the forehead, and which is also called the straight or antero-posterior diameter; 3. The *bi-parietal*, or transverse diameter, reaching from one parietal protuberance to the other, and which is three inches and a half; 4. The *bi-temporal*, or smallest diameter, measured from the root of one zygomatic apophysis to the opposite one, and whose length is two inches and a half; 5. The *vertical* or *trachelo-bregmatic*, which passes through

* The diameters of the fœtal head given here, by the author, correspond with the teachings of the distinguished professor of midwifery in the University of Pennsylvania.—To the *seven*, however, he adds two more; the *naso-mental*, extending from the root of the nose to the chin, which is an inch and a half; and the *naso-frontal*, which extends from the same point to the top of the forehead—measuring, also, an inch and a half. These diameters come short of the measurement of a majority of the heads of children born in Philadelphia.—H.

the head perpendicularly, descending from the vertex to the anterior part of the occipital foramen, and is about three inches and a half; 6. The *fronto-mental*, or facial, whose name sufficiently indicates its situation, and whose extent is three inches; 7. Finally, the *occipito-bregmatic*, the most important of all, whose posterior extremity is situated between the occipital protuberance and foramen magnum, and proceeds to terminate at the anterior fontanelle; its length is nearly three inches and three-quarters.

522. *Circumferences.* These various diameters are accompanied with an equal number of circumferences, which should receive the same names, and whose lengths are equally various: 1. The *occipito-mental*, or great circumference, which divides the head into two lateral halves exactly similar to each other, passes at the same time over both extremities of the occipito-mental diameter, and which, when multiplied by three, equals the length of the circumference, and also over those of the fronto-mental, occipito-frontal, vertical, and occipito-bregmatic; 2. The *facial* circumference, which passes over the forehead, the chin, and the cheeks; 3. The circumference of the *vertical diameter*, which passes a little in front of the parietal protuberances, and thus divides the head transversely; 4. That of the *occipito-frontal* diameter, which at the same time embraces the extremes of the transverse diameter, and separates, horizontally, the vault from the base of the cranium; 5. That of the *occipito-bregmatic* axis, which is also the special circumference of the bi-parietal diameter, and the most important of all, for in all natural labours it is found in relation with the circle of the pelvic straits; 6. Finally, the circumference of the *bi-temporal* or smallest diameter should pass also over both ends of the vertical or occipito-bregmatic; its existence ought not to be admitted except in the greatest possible degree of reduction of the head; a knowledge of it then becomes of the highest practical interest, for by comparing its line of tension, that is to say, its bi-temporal axis with the vitiated diameters of the pelvis through which the child has to pass, we can ascertain whether delivery will be practicable or not.

523. *Varieties.* It is not necessary for me to observe that these measurements should be taken merely as mean terms, and that there is no more uniformity in the size of the foetal head than in the other parts of the body; but I ought not to fail to remark, that they are susceptible of various degrees of reduction or elongation, whether by means merely of the uterine contractions, or by the mechanical action of the instruments that are sometimes employed in midwifery. Thus the occipito-frontal diameter, when compressed at its extremities, may be shortened several lines, by the over-riding of the corresponding edges of the frontal, parietal, and occipital bones. The same is true of the transverse and occipito-bregmatic axes, whenever the pressure bears chiefly on the two opposite points of their circumference; but in order to form a

clear idea of the changes that the head may undergo in this regard, it is indispensably necessary to obtain correct notions as to the arrangement of the bones of the head at birth.

524. *Bones of the skull.* In the fœtus at term, the eight bones of the skull, the *frontal*, *occipital*, the *two parietal*, the *two temporal*, the *sphenoid*, and *ethmoid* bones are far from possessing the same firmness as those of the adult; those of the vault are still quite flexible, and separated from each other by membranous spaces of greater or less size; the frontal is formed of two symmetrical pieces; the thin or flattened portion of the occipital and the squamous portion of the temporal are pretty frequently separate from the petrous and condyloid portions respectively; the basilar apophysis, the body of the sphenoid; the petrous portion of the temporal, and the several pieces which constitute the base of the cranium, are on the contrary almost completely ossified, or at least form with the cartilages which unite them an incompressible mass.

525. From the above arrangement it follows, 1. That the diameters of the vault of the cranium alone are reducible in labour; 2. That whenever the diameters of the pelvis are smaller than those of the base of the fœtal skull, delivery is physically impossible without the aid of art; 3. That in this way the medulla oblongata, the pons varolii, the tubercula quadrigemina, and the peduncles of the cerebrum and cerebellum, are completely protected, while the cerebral and cerebellar lobes, which are almost unconnected with the maintenance of the vegetative life of the fœtus, are alone liable to be slightly compressed.

The numberless varieties of which the dimensions of the head are susceptible has long since convinced accoucheurs of the necessity of discovering some means by which to ascertain what they are in the fœtus while still contained within the maternal organs; but it must be confessed, notwithstanding M. Flamant's opinion, that all attempts of the sort have been hitherto fruitless. But while I release the reader from a tedious description or even enumeration of all the different methods that have been proposed at various periods, it seems indispensably necessary for me to say a few words on the researches of one of my former fellow-students upon this subject.

526. *Mensuration.* By measuring a certain number of dried heads, M. Foulhoux ascertained, 1. That a line drawn from the fronto-nasal suture to the edge of the upper alveoles, represents, very nearly, one half of another line, drawn from the superior angle to the great foramen of the occipital bone; 2. That the space between the fronto-nasal and fronto-parietal sutures is equal to that which extends from the posterior edge of the coronal, and the point of the occipital; 3. That by adding five or six lines to the occipital arch we obtain the length of the sagittal suture; 4. That the bi-parietal diameter is six lines longer than the sagittal suture;

5. That the facial line multiplied by three also gives the length of the transverse diameter; 6. That the occipito-frontal diameter exceeds the bi-parietal by nine lines. So that if we can succeed during labour in measuring, with any degree of precision, either the fronto-maxillary line, or the naso-parietal arch, or the occipital arch, or lastly, the sagittal suture, it is afterwards easy to determine the antero-posterior and transverse diameters of the cranium.

527. The assertions of M. Foulhoux, subjected to pretty numerous experimental tests, have appeared to me to be, in general, correct; but I have also found that the proportional differences which he endeavours to establish are too variable to admit of their being very usefully employed in practice. Even were they to prove constantly and rigorously correct, how shall we ever be able to distinguish through the soft parts, and within the maternal organs, the precise length of the occipital arch, or the frontal arch, or even the facial line? The thing appears to me to be impossible.

528. The sutures of the fœtal cranium are more numerous, more movable, and wider than those of the adult. As they, together with the fontanels, serve to mark the positions of the head, it is very important for the accoucheur to have them always present to his memory.

The *sagittal*, straight, or antero-posterior suture extends from the root of the nose to the superior angle of the occipital bone, and may be divided into two portions, the naso-parietal, which unites the two pieces of the frontal bone, and the parietal portion, which is formed by the conjunction of the two parietal bones at their superior edges. The *fronto-parietal*, coronal, transverse or anterior suture crosses the one above mentioned at right angles, at the place where its two halves unite. The *occipito-parietal*, lambdoidal, posterior or occipital suture seems to be only a bifurcation of the sagittal. As the squamous, or temporo-parietal sutures are concealed under a thick layer of soft parts, they hardly deserve to be mentioned in a work on midwifery.

529. The *lambdoidal* suture, so called from its resemblance to the Greek Δ ; is perhaps the most frequent cause of error, as it may be mistaken for the fronto-parietal. It differs from it, however, because its two branches, which are oblique to each other and to the sagittal suture, really form two distinct and independent sutures, while the two moieties of the anterior suture are only continuations of each other, and constitute but one and the same line.

530. There are usually found at the points where these sutures cross or terminate, certain membranous spaces called fontanels or fountains of the brain.

The *anterior* or frontal fontanel, which is sometimes called the bregmatic fontanel, because it in fact answers to the *bregma*, forms the common point of union of four bony angles, viz., the superior angles of the two portions of the frontal bones, and the two antero-

superior angles of the parietal bones; it is larger or smaller accordingly as these angles are sharper or rounder; it is of a lozenge shape, and generally extends much farther between the two portions of the coronal than of the parietal bones.

The *posterior*, or occipital fontanel, which forms a part of the summit of the head, is situated at the spot where the sagittal loses itself in the lambdoidal suture; it is always very narrow, and in some subjects scarcely distinguishable; its triangular shape prevents it from being mistaken for the one before mentioned; but as a middle suture sometimes divides the occipital bone into two pieces, and as the superior angle of this bone is sometimes wanting, it must be remembered that only three branches issue from this fontanel, or if there should be four, the two lateral branches proceed obliquely towards the mastoid processes, and do not cross the other at right angles, as is the case at the anterior fontanel.—This is the most important fontanel, since it indicates the presence of the summit of the head.

The *inferior* or lateral fontanels, four in number, two on each side, are found at the points of termination of the anterior and posterior sutures, and are of no use in the practice of midwifery.

531. The head is further divided into five regions or *ovals*: one superior, in which are to be observed, the summit behind, the bregma and sinciput in front, the vertex in the middle, and which is bounded below by the occipito-frontal circumference; another, inferior, which is represented by the base of the cranium and posterior part of the face; a third, anterior or facial, which is enclosed in the fronto-mental circumference; the last two, lateral or temporal, which comprise whatever is left out by the other, and whose dimensions have reference, in labour, to those of the occipito-mental diameter, which renders presentations of them highly disadvantageous.

532. The *articulation* of the head with the vertebral column merits the most serious attention; for want of a careful study of it a vast number of accoucheurs and midwives bring children still born into the world, who, a few minutes before, were strong and full of vigour.

The union of the atlas with the occipital bone is a very close articulation, which scarcely admits of any motion except flexion and extension; that of the atlas with the axis is a rotatory ginglymus, so arranged, that if the pivot motion of the head is carried beyond a quarter of a circle, the articular surfaces immediately separate and the spinal marrow is at the same moment compressed, torn, or, even entirely broken off; so that, if the chin of the fœtus turns so far as to pass behind the point of the shoulder, death ensues immediately. On the other hand, it is in the occipito-vertebral articulation that we find the cause of the so frequent presentations of the vertex rather than the face. In fact, when seen

in an antero-posterior direction, the head resting on the top of the spine represents a lever of the third kind: during the efforts of parturition, the power being evidently represented by the vertebral column, the points of rest and of resistance must necessarily be met with at the extremities of the occipito-mental diameter. Now, if the occiput almost always descends first, while the chin descends but very rarely, it depends upon the more advantageous action of the power upon the occipital than upon the opposite extremity of this lever, the condyles being nearer the former than the latter of these points.

§ V. OF THE ATTITUDE, AND POSITION OF THE FÆTUS DURING PREGNANCY.

533. During the whole course of pregnancy the fœtus is bent forwards, so as to form a kind of circle, more or less complete; at full term it is found with the head bent forwards, on the breast, the feet turned up to the front part of the legs, the legs against the hind part of the thighs, the thighs on the anterior surface of the abdomen, the heels crossed and very near the ischia, the arms applied to the sides of the thorax, the forearms bent, and crossed in front of the sternum, as if to support the chin betwixt the two hands. It therefore forms an oval mass whose large end is represented by the pelvic extremity of the trunk, and its apex by the cephalic extremity. In this state its great or *occipito-coccygeal* diameter is only ten or twelve inches in length, and may even be shortened one or two inches by pressure exerted upon its two extremities.

534. It may be affirmed, in general, that the laws of gravity determine the position of the fœtus, until the last stage of gestation; suspended in the centre of the ovum by means of the umbilical cord,* loose and very movable in the amniotic liquor, it necessarily falls to the lowest point of the cavity in which it is contained; the cord being inserted much nearer to the coccyx than to the occiput, renders it necessary for the cephalic extremity of the fœtus to fall to the lowest part of the womb: therefore, since, even when the woman is lying down, the neck is lower than the fundus of the womb, it is clear that the head must naturally be turned towards the superior strait in a great majority of cases, as is proved by daily experience.

535. However, the ancients entertained a different opinion; according to them, the fœtus has its head upwards, the pelvic extremity turned towards the margin of the pelvis, and the hinder part of the breech resting against the sacro-vertebral angle, until

* It is hardly correct to say that the fœtus is suspended, &c., by means of the umbilical cord: that cord is twenty inches in length: and as the whole length of the womb is only twelve inches, it follows that the child is not *suspended* by the cord. It is *connected* with its parent by it.—M.

about the seventh month; then, by means of certain quick and somewhat convulsive motions, it turns over, performing a somerset; so that the forehead comes to take the place of the breech, and *vice versa*. This hypothesis, generally adopted until the time of Baudelocque, and since that period still defended by several authors, principally in Germany, is now abandoned to the vulgar, who also are beginning to give it up.

536. If a pregnant woman dies before the seventh month of gestation, the head of the fœtus is found turned towards the neck of the uterus, just as it is at the full term. I have opened the bodies of three women who died between the third and sixth months of their pregnancy, and in these three cases the occiput was below. Who has not seen the fœtus come head foremost in abortion as at the full period? From October, 1823, to the month of April, 1826, eight miscarriages of from four to seven months took place under my care at the *Hospital de Perfectionnement*; I have observed nearly the same number in my private practice, and at my public lying-in ward: but in all these cases I found the breech presenting in only two instances. Further, it is not uncommon to find the neck sufficiently softened before the seventh month to permit the finger to pass in so as to touch the naked ovum in the womb, and we almost always find that the head is downwards. Another reason advanced by the moderns as decisive, but which, if taken singly, would not appear to me to be very conclusive, is derived from the length of the fœtus, compared with the dimensions of the uterine cavity. It has been said, since the fœtus after the sixth month is from ten to twelve inches long, it is physically impossible for it to turn after that period in the cavity of the womb, whose transverse and antero-posterior diameters do not exceed six or eight inches: no doubt; but they forget that the fœtus is doubled up in the amnios, and instead of twelve, its long diameter is only six or eight inches long; they also forget, that even at full term the child sometimes changes its position during labour, and that even at the period of its greatest development, the diameter passing from its occiput to the coccyx does not always exceed the length of the horizontal diameter of the womb.

It is not, therefore, correct to maintain that the proportional dimensions of the uterus and fœtus raise an insurmountable barrier to the somerset motion; if this transposition has no existence, it is because the relative weight of the head renders it unnecessary.

§ VI. OF SUPERFŒTATION.

537. The name of superfœtation is given to the vivification of a germ, in a woman who already contains a secundated ovule in some part of her generative system.

The existence and the possibility of this fact, admitted and de-

nied by turns by the physicians of all ages, constitutes a question upon which modern naturalists have not as yet decided. The ancients have handled it so slightly, that it is really useless to oppose them. According to Aristotle, "cases of superfætation have been seen in women, and twelve fœtuses have been seen to come away in a single miscarriage in this manner. When the two fœtuses have been produced soon after each other, they are born as if they had been twins, as the poets tell us of Iphicles and Hercules." The philosopher also cites, as an instance of superfætation, a woman who brought into the world two children, one resembling her husband and the other her lover!

538. Almost all the cases we have of superfætation seem to me to be referable, 1. To twin pregnancies, in which one of the children, having died long before the full term, has been preserved within the membranes, not to be expelled until the other which continued to live; 2. To pregnancies of twins unequally developed or born at different periods; 3. To cases of extra-uterine pregnancy, which did not interfere with natural gestation; 4. Lastly, to cases of double uterus.

539. Nothing is more common than to see, in compound pregnancy, one of the fœtuses lose its life, and when born exhibit the appearances of a fœtus of from two to six months, although in fact it is nine months old, and everybody knows that most monsters are met with in company with a well-formed fœtus.

A lady of La Varenne, near Tours, was brought to bed of a stout boy in 1819; with the after-birth, Mr. Mignot, her surgeon, received another fœtus enclosed within the same ovum, but without a head, neck or arms.

A lady of the Fauxbourg Saint-Germain was delivered in 1824 of a vigorous and very stout child; Madame Forbet, the midwife, brought me the after-birth, and at some distance from the umbilical cord I found, supported by a pedicle two inches in length, a fleshy mass, in which were the evident remains of a fœtus. In March 1827, M. Baroilhet had the kindness to give me a monstrous product, which possessed neither head nor members, and which was expelled together with a healthy fœtus, &c.

In 1824, at the *Hospital de Perfectionnement*, I received at the same time with a full-grown fœtus, a dead one, which as to development had not passed beyond the third month. M. Defermont has shown me a similar instance. In the month of October, 1826, Madame Badinier, a midwife, brought me two fœtuses, one of which, quite deformed, appeared to be of about two months, and the other of five or six; they had both escaped from the same ovum, and before the full term. Bauhin speaks of a woman who gave birth on the same day to a fœtus at term, and to an embryo as long as the finger, both enclosed in a single envelop. Ruysch saw the wife of a surgeon of Amsterdam delivered, with an inter-

val of two hours, of one child, full of life, and of an embryo which could not have been of more than three months growth, with its cords full of hydatids. Percy speaks of a woman who, after giving birth to a small but lively boy, brought forth, surrounded by a black fungous mass, a female fœtus of the fourth month, *in a pretty good state of preservation*. Laurette, says Zacchias, was delivered, eight months after the death of her husband, of a badly formed male child, which never gave any signs of life. One month and one or two days after this she was delivered of a second child, which was in good health, and which lived.

And the authors conclude that these were cases of superfœtation!

540. 2d. When two fœtuses are contained within the uterus, one may grow more rapidly than the other; one may be expelled before its full time, and the other not be born till some time afterwards, &c.

To this class belongs, if, indeed, there be not a good many belonging to the same category, the case of a lady named Dupuis, at Saint-Germain-en-Laye, who had a miscarriage at four months and a half, and four months after that brought a healthy boy into the world; the case which MM. Desgrange and Foderé look upon as decisive, and in which B. Franquet was delivered of a healthy fœtus five months and sixteen days after she had miscarried of a seven months' pregnancy; the case of Madame Bigaud, who on the 30th of April, 1748, brought forth a living male child, and notwithstanding that, was delivered on the 17th of the following September of a second fœtus quite as strong and lively; another communicated by M. Rexain, in which one of the children was born three months after the other; those of M. Delmas of Rouen, of M. Pignot of Issoudun, of M. Wendt of Breslaw, of Dr. Fahrenhost, &c.

541. The two cases by B. Franquet and Madame Bigaud, the one mentioned in the *Recueil de la Société de Médecine*, in which it is stated that a woman at Arles was delivered of a full-grown child in 1796, and of another, also at full term, five months afterwards, in 1797; another by Dr. Stearns, in which a negro woman was delivered of a black child in about the eighth month, and a few hours afterwards of a white fœtus of about four months, which exhibited signs of life, are beyond dispute the most difficult to understand. But as it is not impossible that they might at Lyons have supposed a fœtus to be seven months, when in fact it was not more than five months old, while the one last born might have exceeded the ninth month of gestation; and as they might have made the same mistake at Strasburg; and as the signatures of notaries do not constitute evidence in such cases, we may be permitted to suspect that some error has crept into these stories.

542. 3d. When an extra-uterine conception takes place, the

womb sometimes swells and becomes filled with concrescible matter, as in an ordinary conception; in such a case superfœtation appears to be impossible: but if the womb remains in the same state as before fecundation, it is clear that a new conception may take place during the existence of the first gestation. In support of these assertions, I may refer to an instance of extra-uterine pregnancy which lasted for three years, during which time the woman conceived and brought forth a well-formed child; and another case for which we are indebted to M. Clét, in which it is said that in a woman who died suddenly, one fœtus was found behind the womb in the excavation of the pelvis, and another in the cavity of the womb itself.

543. 4th. When the womb is divided into two cavities by a perpendicular septum, and these cavities open separately into the vagina, it is evident that two germs may be fecundated at intervals more or less remote; in a word, that superfœtation may take place. This is the way in which the following fact ought to be understood, which has been cited by M. Cassan, and collected by Madame Boivin. A woman forty years of age was delivered of a little girl on the 15th of March, 1810; *the cavity of the uterus, which was already contracted, was examined without any thing being found in it*; and yet this woman, whose abdomen had remained pretty large, gave birth to another child on the 12th of May of the same year.

544. We ought also to admit the existence, or at least the possibility of another kind of superfœtation. A woman at Charleston gave birth on the same day to twin children, one of which was black and the other white, and accounted for it by stating that after leaving the arms of her husband in the morning, one of his negroes, armed with a pistol, came and compelled her to have connection with him. A negro woman at Guadaloupe brought forth two full-sized boys, one a black and the other a mulatto, and confessed she had had connection on the same evening with a negro and a white man. Another negro woman had three children at a birth; one black, one white, and the third, a *cabre*. A white servant girl in Montgomery county brought into the world at the same lying-in a white girl and a boy that was perfectly black. A negro and a white servant both disappeared upon learning that the girl was pregnant. According to M. Gardien, M. Valentin has related a case similar to the one above. A mare foaled a colt and a young mule at an interval of a quarter of an hour; she had been covered by a horse, and five days after that by an ass.

545. Granting all possible authenticity to these observations, and supposing their correctness to be demonstrated, the ideas of physiologists that prevail at the present day admit of their easy explanation. Two ovules may become impregnated, one after

the other, in a woman who grants her favours to two or more men on the same day or in the space of two or three days, that is to say, up to the moment when the excitement of the first fruitful coition occasions the effusion of that coagulable lymph in the cavity of the womb which afterwards becomes the *membrana caduca*.

546. Of two germs vivified by the same copulation, one may not descend into the uterine cavity until a considerable time after the other; the maturity of the two ovules may not have arrived at the same degree of perfection at the instant of their union with the principle furnished by the male; one of the germs may happen to be disengaged with difficulty from the ovary, remain adhering to it without growing with the same rapidity as its congener, and not escape from the vesicle, nor pass into the tube until after a greater or less lapse of time.

547. I am astonished that modern physiologists, and even some medico-jurists, among whom should be mentioned M. Orfila, have admitted the existence of superfœtation up to the moment when the ovule reaches the womb, while they deny the possibility of its occurring after that period. It ought to be equally rejected in both cases. The concrescible lymph or anhistous membrane is fully as capable as the ovum itself of intercepting all contact between the seminal principle of the male and that of the female. To conclude, superfœtation may take place; 1. In the case of extra-uterine pregnancy; 2. In that of a double uterus; 3. Where a woman has had commerce with two different men on the same day, or even at short intervals with the same man; 4, and lastly, while the uterine cavity is not filled with any substance, and the orifices of the tubes remain perforate.*

* The doctrine of superfœtation is intensely interesting to the medical philosopher, because it is irreconcilable, in its broad sense, with the present theory of conception.

It is conceded by all the modern physiological writers that *twins* and *triplets* are the result of a species of superfœtation, as, in a majority of cases, they proceed from more than one sexual embrace. This fact is proved by women bringing forth, at the same birth, *white, mulatto, and black* children, and acknowledging that they were the product of different fathers.—In these cases, however, the second conception followed the first only a few hours.—And it is also admitted that an extra-uterine and an intra-uterine gestation may be in progress at the same time, the result of conceptions that had taken place a month or two apart, which constitutes another variety of superfœtation.

Neither is it denied that superfœtation has repeatedly taken place where *double uteri* existed; the one uterus becoming impregnated, and,

SECTION 2.

Functions of the Fætus.

§ I. OF THE NOURISHMENT OF THE FÆTUS.

548. Few questions in physiology have occupied so much of

after three or four months, the other, followed by two accouchements, corresponding with the different periods of conception; but the idea of superfætation in a single matrix, is scouted by all who maintain that, in order to produce conception, the semen masculinum must pass to the ovaries through the uterus and Fallopian tubes.

The modern doctrine of conception, termed *epigenesis* is sustained, it is true, by many well-established facts, and by the highest medical authority; yet I confess that my confidence in its validity has been shaken by reading cases of superfætation that have been recorded by medical gentlemen, although at variance with their preconceived hypotheses.

I here record one of the cases which I have translated from the 53d volume of the *Dictionnaire des Sciences Médicales*, because I know it will be read with pleasure by every one that is interested in the doctrine of superfætation.

“The case of Maria Bigand, aged thirty-seven years, the wife of Edmund Vivier, the overseer of the Military Hospital at Strasburg.

“This woman was delivered at full term of a living son on the 30th of April, 1748, at 10 o'clock in the morning. The accouchement was so prompt and happy that, an hour after it, Maria arose and went out from the house of the midwife, where she was delivered, taking her infant with her in her arms, and returned to the Hospital at which she lived. She lost but a moment with her accouchement, and that which astonished her so much the more, was, that in her two previous confinements she had been debilitated by a profuse flow of the lochia.

“A quarter of an hour after this accouchement, she felt a decided movement in her womb, which she communicated to the midwife, persuading herself that she was going to bring another child into the world.

“The midwife endeavoured to soothe her, but Maria continued to feel the same kind of movement as that which is commonly felt during pregnancy. Her mammæ were naturally large, but did not fill with milk, so that at the end of a fortnight she was still obliged to feed her child.

“These events, connected with the same symptoms of pregnancy she had felt before under similar circumstances, disturbed her mind, and in-

the attention of the learned, as that of the nourishment of the fœtus. Different authors have by turns placed its source in the liquor produced her to send for M. Le Riche, the Surgeon Major of the Hospita!, who ascertained, by the touch, that the evils of which she complained depended upon a true pregnancy of several months' standing.

"Maria was actually delivered on the 16th of September, of the same year, at five o'clock in the morning, of a living daughter, known to be at full term, from the magnitude of its body and the proportion of its limbs.

"This time Maria lost much of the fluid (liquor amnii) which usually escapes during parturition, and her breasts filled sufficiently to nourish her child. M. Eiseman, who records the case, adds that the second infant lived one year and two days, whereas the first lived only two months and a half. He saw these two children at their birth, and states that the first was not as large or as strong as the second.—Besides, the first was badly nourished, the father being unable to bear the expense of employing a wet-nurse; but the second, which the mother nourished herself, was fleshy and even fat.—She died in teething.

"Thus," continued the professor, "from the last of April to the 16th of September, a period of four months and a half, which must satisfy us that this woman was only at half term of the second child, when she was delivered, in April last, of the first. I do not think there ever was a case of superfætation better characterized than this. Maria has had, since this accouchement, another child, and is again near her confinement.

"Maria Bigand was delivered at full term of an ordinary sized child, and afterwards died of an acute disease in the year 1755, seven years after the period of her superfætation.

"This example of superfætation made much noise, and persons reasoned variously upon the subject. Professor Eiseman having had occasion in his dissections to find two cases of *double uteri*, one of which is still preserved in the Museum of the Medical Faculty, presenting two vaginae and two hymens, thought that such would prove to be the case in this woman. He was eager, therefore, to seize the earliest opportunity to assure himself of it.

"Her body was accordingly opened before the public at the amphitheatre; but he was much disappointed when he found the uterus absolutely single, and its appendages in every respect as in other women."

A number of similar cases are recorded, but this alone establishes beyond all cavil, that superfætation has occurred in a single matrix—and that the two conceptions must have taken place more than four months apart.

amnii and in the placenta, in the umbilical vesicle and in the allantois, in the gelatin of the cord, and in the caducous membrane.

549. What I have elsewhere (410) said of the *anhistous membrane* and its fluid, seems to me to prove at least that that tunic cannot concur in the development of the ovum longer than during the first fortnight of its existence: If Chaussier and some others have entertained a different opinion, it is because they had acquired false notions concerning the caduca, and its nature.

550. The *gelatin of the cord*, which by Warthon, Rouhault, Lobstein and Béclard, has been supposed to play a part in the matter, has no more to do with it than the caduca, and it is not true that it becomes less abundant in quantity as the fœtus grows larger.

The idea of making the fœtus live upon the fluid with which it is surrounded, is the most ancient of all, and apparently the most natural; it gives rise to two very distinct theories; by one the water of the amnios is supposed to be swallowed and digested; according to the other it is absorbed in various ways.

551. In order to prove that the *water of the amnios* serves for the nourishment of the fœtus, the old writers, particularly Harvey and Diémerbroeck, have treated at great length on its nutritious qualities, and on the lactescent matter which, in their opinion, it always contains; later authors have relied upon the assertion that small animals plunged in it live longer than they do when plunged in common water; on its being more abundant and fuller of nutritive principles, in proportion as pregnancy is less advanced; on

Since writing the above, I have received an interesting communication on this subject from my late pupil, Dr. Samuel K. Ashton.

"*Sunday, June 22d, 1845.*—While at the breakfast-table, Mary B——r was suddenly taken with severe pain and flooding, and, immediately after she reached the bed, was delivered of a fœtus of about *six months' growth*. The child, judging from appearances, had been dead a fortnight, and this corresponded with the mother's impressions; as she had not felt the quickening for about that length of time.

"Upon examination, I found the child completely separated from the placenta, and the cord so softened by putrescence, that it came away with the slightest traction effort, leaving the placental mass behind, which, after a few hours, was expelled by the uterine contractions.

"The next day, at three o'clock in the afternoon, after considerable suffering and hemorrhage, she voided a fœtus two months and a half old, plump, healthy, and well developed. There were thirty-one hours between the birth of the first and second fœtus. The patient is quite well."—H.

the diminished power of absorption in the cutaneous surface of the fœtus, as it approaches nearer to the full term; and on certain cases of fœtuses being born alive without any umbilical cord.

552. Without stopping to refute these various propositions one by one, it may be remarked that previously to drawing practical consequences from them, their correctness should have been ascertained; but it has never been proved that the liquor amnii is more nutritious at the beginning than at the close of pregnancy; or that the fœtus absorbs more at one time than another. As to the observations of Van-der-wiell, of Dennis and Littre, on the absence of the umbilical cord, and on the rupture and cicatrization of its divided extremities, they are too improbable, and accompanied with details far too vague for them to deserve the least credit.

Nothing, positively nothing, warrants our believing with Alcmaeon, Boerhaave, Buffon, and Van-den-Bosch, that the waters are taken up by the cutaneous surface. The last author, it is true, tells us he saw the lymphatic vessels full of a fluid resembling the water of the amnios, and that they became fuller in the limb of a cow's fœtus, strongly bound round with a ligature and plunged in the liquor of the membranes; but even admitting the experiment to be correct, what conclusion can we draw from it? Are not the lymphatic vessels habitually filled with serosity? Do they ever fail to become distended when a mechanical obstruction prevents the free passage of the blood through a part, or the whole of a limb?

553. Founding on the opinion of Hippocrates, of Harvey, Rudbeck, &c., and on some facts of his own, Diémerbroeck maintains that the fœtus is nourished by the mouth. His reasons are, that the child's stomach is always filled with a lacteous matter; that there are excrements in its bowels; that immediately after birth, or previously to sucking, it frequently vomits a whitish fluid; that it sucks a finger if put into its mouth, even while still within the sexual organs; and that its stomach would not be able to perform its digestive function immediately after parturition, if it were not previously accustomed to it. If asked whence the fœtus derives this nourishment, he answers that it is at first from the seminal fluid, and subsequently from the lacteous juice contained in the amnios.

Haller, Darwin, &c., add to the reasons of Diémerbroeck and La Courvée, that the amniotic liquid has been found in the stomachs of many fœtuses; that in a pregnant cow that had been frozen, Heister found the mouth, œsophagus and stomach of the fœtus filled with an icicle which was continuous with the waters; that many observers have met with silky hairs in the meconium, and they conclude that all these matters could not have got into the digestive passages by any other means than deglutition.

More recently, this opinion has been strengthened by the case of a fœtus in which the bowel was completely divided near the cæcum, and contained meconium in the portion connected with the stomach, while the larger intestine was almost completely obliterated; by another case mentioned by M. Dubois, in which the alimentary canal being contracted near the pylorus, contained meconium only in the part above the contraction; and lastly, by the fact that Bécларd having coloured the liquor amnii with ink, in a bitch that he experimented on, found some of it in the œsophagus and stomach of the young.

554. None of these proofs are conclusive; most of them do not even deserve to be seriously combated. The presence of hairs in the intestines, might, in fact, be explained in another way; but the cases of that kind that have been reported are far from authentic. To the facts noticed by MM. Desgranges and Dubois, may be opposed one published by M. Piet, and in which the intestine, though separated from the stomach, is said to have been, nevertheless, filled with meconium. I have myself dissected a fœtus, at full term, whose œsophagus upon reaching the diaphragm ended in a completely impervious blind sac, notwithstanding which its colon was full of meconium. While enclosed in the membranes, the mouth of the fœtus is closely shut, at least until a pretty advanced stage of pregnancy: to swallow, either by suction or deglutition, it should be able to perform the motions of inspiration and expiration, of elevation and depression of the larynx. Acephalous and astomatous fœtuses, and those which come into the world with all the openings of the mucous membranes occluded, are not on that account less completely developed, and their alimentary canal, according to the reports of certain observers, does not contain less of meconium or of hairs. It does not necessarily follow from the circumstance that liquor amnii has been found in the stomach, that the fœtus swallows and is nourished by it; would it be right to infer that a swimmer naturally drinks water, because we find some of it in the stomachs of drowned persons? Finally, ought it not to be enough to decide for ever the question as to the nutritive properties of the liquor amnii, to observe, that Bartholin and M. Morlanne have seen the fœtus continue to live in the womb more than a month after the complete evacuation of the waters.

555. It is therefore superfluous to inquire whether the water of the amnios, after passing into the intestines, is simply absorbed from them, as was thought by La Courvée to be the case, or whether, as Diémerbroeck, Boerhaave and others pretend, it must undergo a previous digestion in those organs; neither is it necessary to refute M. Lobstein, who is not far from making it pass in, partly, by the genital organs of the fœtus; nor Osiander and Muller, who make out, that it is absorbed, then modified by the breasts, to be subsequently carried to the thymus gland and

thoracic duct; nor, finally, Schurigius, David, Rœderer, Scheele, Winslow, Heroldt, Béclard and M. Geoffroi Saint-Hilaire, who believe that it penetrates into the trachea and bronchia, in order to be there elaborated, or serve in some way for the purposes of the fœtal nutrition.

Notwithstanding the importance attributed by some writers to the water of the amnios, all the authors, except La Courvée and a few others, have confessed that the *placenta* performs the principal part in the nutrition of the fœtus, at least during the latter half of the period of gestation.

There are some who, with the ancients, suppose that the placenta, by means of some peculiar lymphatics, takes up a milky juice, a real chyle, for the purpose of modifying or transmitting it to the organs of the fœtus.

556. Others have asserted that the placenta takes nothing from the womb except the *oxygen*, that it performs the functions of a respiratory organ, that it is the physiological *lungs* of the fœtus, and that in this view the uterine arteries represent, in some measure, the bronchia and trachea. In a figurative sense these assertions are not wholly without foundation, as I shall remark further on; but when taken in a literal sense, as they have been by an infinite number of physiologists, they become valueless.

557. A majority of writers maintain that the fœtus is nourished and developed by blood furnished to it by the mother; this is another disputed point: is it real blood, or only some of its principles? Does it pass directly from the vessels of the mother into the circulatory system of the fœtus? Is it merely poured into the sinuses of the placenta? Must it, or must it not be subjected to some preparatory elaboration before it reaches the placenta?

558. Galen, Aristotle, Vesalius, Columbus, Maurocordatus, Hildanus, Haller, and a majority of accoucheurs have been of opinion that the blood passes directly from the mother to the fœtus; the partisans of this hypothesis, which has been combated in detail by Diémerbroeck, rely upon the existence of vessels passing from the womb to the placenta; on this latter body having been seen, as by M. Ribes, to grow and live after the expulsion of the fœtus; on the circumstance, that the detachment of the placenta, whether during pregnancy or after delivery, always gives rise to hemorrhage; that the uterine hemorrhages cause the fœtus to die exsanguious; on blood having been observed to flow from the placental end of the cord so as to constitute a dangerous hemorrhage; on M. Magendie's having found the odour of camphor, and the colouring matter of madder in the young of animals fed on those substances, on the presence of large orifices observed by various authors on the internal surface of the womb; on the fact, that the best mode of arresting flooding is to compel the womb to contract;

and above all, on the passage of various substances, when injected in the uterine vessels, into the organs of the fœtus.

559. None of these reasons are demonstrative; we have seen, above, that it was necessary to imagine the existence of vascular anastomoses between the ovum and uterus: supposing the placenta does sometimes remain adherent to the uterus, and continues to live, that does not at all prove that there is a direct sanguine circulation from one to the other; it is false to say that the detachment of the placenta always occasions hemorrhage; and even if it were true, it would no more militate in favour of than against the idea of immediate anastomoses, for the blood in that case may just as well be poured out by exhalation, as from ruptured vessels. If it be true that the heart and vessels of the fœtus are emptied of their blood when the mother dies with hemorrhage, Wrisberg proves that the contrary has been very often observed; besides, it does not follow, because a child is born anemic after a uterine hemorrhage of several weeks' duration, that the blood passes unchanged to the cord, for if the woman be for a long period anemic herself, it is very natural that the fruit of her womb should also be feeble: further, it seems to be forgotten that many of those hemorrhages, as those that depend upon insertion of the placenta over the cervix, may come from the vessels of the placenta, and consequently, from the fœtus, as well as from the mother. When blood flows from the uterine end of the cord that has just been cut, it is not at all because the circulation continues to go on from the womb to the placenta, but it is simply owing to the contraction of the womb and of the vessels of the placenta itself, and of the cord; it is the after-birth disgoring the fluids it contained, and not new blood coming from the woman. The presence in the fœtal organs of medicinal or alimentary substances taken by the mother, is explained by the laws of imbibition or by absorption, quite as satisfactorily, as by an uninterrupted continuity of the vascular systems of the ovum and uterus.

560. Still there are the anatomical injections: they have been in vain attempted by Ruysch, Haller, &c., but as a thousand negative facts do not destroy a single positive one, these injections are constantly appealed to in support of the hypothesis in question.

561. M. Dubois formerly exhibited to the Academy of Surgery, a specimen he had prepared, and in which the injection passed into the placenta, through what he denominated the placentouterine vessels; Chaussier succeeded in impelling mercury into it; Béclard and M. Dugès have succeeded with coloured oil. In the body of a pregnant woman prepared for examination, M. Deneux saw the uterine sinuses completely filled with injection, and continuing without any line of demarkation into the placental sinuses, which were also filled with the same material. Mr. D. Williams has recently performed some experiments, from which

it appears that linseed oil, injected into the aorta or hypogastric arteries, penetrates into the organs of the fœtus; and M. Biancini, who has performed experiments on one woman who died whilst in labour, on another who died in a week after delivery, and on a third who died with flooding, as also on cats, rabbits and cabiais, assures us he obtained the same results with size and with mercury, which he thinks, answers better than oil; in addition to the utero-placental arteries, the Italian physiologist describes a set of veins of a corresponding character.

562. But it seems to me there is a strange misconception of the value of such experiments. How happens it that they have not been regarged as but little applicable to the explanation of what takes place in the living female? How long has the passage of foreign matters from one vessel to another proved incontestably that the same thing takes place with the natural fluids during the life of the individual?

563. When a pretty fine injection is thrown into the arteries of the belly, the matter readily escapes from the internal substance of the intestines; when thrown into the vena portæ, it returns not only by the veins and the hepatic artery, but also through the excretory bile ducts; when thrown into the emulgent artery, it soon passes into the emulgent vein, as also into the pelvis of the kidney, and the ureter. Notwithstanding the above, we do not conclude that the blood during life is continually transuding into the alimentary canal, nor that it passes from the vessels of the liver into the hepatic ducts or from the kidneys into the tubuli uriniferi and ureters; the oil, glue and mercury employed by Chaussier, and Messrs. Williams and Biancini, are of too penetrating a nature not to go wherever it may be desired to send them; but whether the passage in question does or does not take place, it will certainly never serve to resolve the problem at issue.

564. Hunter and several modern physiologists expect to get rid of the difficulty by admitting that the uterine sinuses pour their blood into the sinuses, or interlobular anfractuositities of the placenta, whence it is subsequently taken up by the numerous capillary orifices of the umbilical vein. This hypothesis, although more specious and rational than the preceding one, is not therefore less difficult to adopt; without referring on this point to what I have already said (478) concerning these pretended sinuses, and their adaptation, I remark: 1. That such an arrangement cannot be admitted to take place in extra-uterine pregnancies; 2. That until the second or third month, the placenta being composed of merely agglomerated filaments, there can be no sinuses betwixt its lobules; 3. That a placenta, although attached upon a fibrous polypus, or upon some indurated portion of the uterus, has nevertheless been found to supply all the materials required for the fœtal nutrition; 4. That I have seen the uterine surface of the after-birth hard,

coriaceous, and without any orifice throughout almost its whole extent, in women who were delivered of children that, although weak, indeed, were nevertheless living; 5. That the large vessels of the womb, said to be continuous with the vessels of the placenta, are, by the very partisans of the doctrine, admitted to be veins; 6. That the uterine veins being, like the veins of all other parts of the body, the vessels of a convergent and not of a divergent circulation, as they should be, consistently with the views of that party, it follows that they are pleased to get venous and not arterial blood from the mother into the placenta.

565. Should it be insisted upon that the fœtus receives completely elaborated blood from the mother, it could only be possible, at the utmost, to say, as indeed it has been said, that that fluid enters the placenta, through simple pores, by a sort of imbibition which might be explained by a mere contiguity of surfaces. To this I can only object, that the blood, as such, does not appear to pass in any way into the ovum. It certainly does not pass there at least in the early periods; for the villous portions of the chorion do not contain vessels until pretty late, and besides, its filaments are never hollow quite to their extremities (475). On the other hand, both Autenreith's and my own experiments demonstrate that the blood of the fœtus does not present the same aspect as that of the mother: it is at first of a rose colour: it then becomes redder, then blacker, and does not exhibit any difference of colour in the veins and arteries. Tiedemann and others have found that it contains a much larger proportion of serum than the blood of an adult, and is less coagulable; in fine, every thing proves that its chemical composition is very different from that of the mother. Even although chemistry had not been able to ascertain for us these differences, would it be right to believe that this fluid need not have, like our aliment, a due relation to the period of our life, whether extra or intra-uterine, and that the blood of an adult woman would not be, in some sort, a poison to so frail and delicate a being as the embryo, or fœtus? Were it worth while to insist upon this point, I might add that, according to the microscopical observations of MM. Prevost and Dumas, the blood-globules are so small in the fœtus, that it would be impossible for those of the mothers to pass through the same canals or same orifices without destroying the equilibrium of all the functions, and producing sudden death.

If, therefore, the blood is poured into the caverns of the placenta, or taken up by the pores of that organ, it must at least undergo some elaboration, some important modification before it reaches the umbilical vein; but what is the nature of that modification? I know not.

566. In conclusion, the nourishment of the ovum is dependent on various sources; at first it is a mere vegetable, which imbibes

the surrounding moisture. The villi of its superficies, real cellular spongioles, acquire in the tube or in the womb, the nutritive principles required for the development of the embryo vesicles; after which the embryo is nourished after the manner of the chick in ovo, or rather like the young plant, which is at first evolved at the expense of principles contained in its cotyledons. It gradually exhausts the vitelline matter contained in the umbilical vesicle; the emulsive substance of the reticulated body or allantois is also gradually absorbed. It reaches the end of the second month; the vessels of the cord are formed; the placenta soon begins to show itself, and suffices to keep up the evolution of the fœtus, by its contact, the spongy cake takes up from the womb the elements of reparation, and operates on them, forming a fluid more or less analogous to blood, which is then absorbed by the radicles of the umbilical vein. The placenta absorbs in the uterus, so as to form the fluids of the fœtus, as the liver, the kidney, the seminal gland, &c., take up from their own vessels the materials from which to form the bile, the urine, the prolific liquor, &c.; as trees and plants absorb from the ground the principles of the numerous compounds they contain: and I see nothing in all these actions very difficult of comprehension.

§ II. CIRCULATION OF THE FŒTUS.

Whatever may be the manner in which blood or other fluids reach the placenta, it is, notwithstanding, necessary for them afterwards to traverse the various organs of the fœtus for their nourishment; however, their circulation does not in all respects resemble that which takes place after the birth of the child.

567. In the adult, the septum that divides the two auricles of the heart is complete, and separates them from each other perfectly; in the fœtus, on the contrary, this septum has an opening through it, called the *foramen ovale*, which is largest in the early stages of pregnancy. Previously to birth, instead of two large trunks, the pulmonary artery furnishes only two small branches to the lungs; but it is prolonged, under the name of the *arterial canal* (*ductus arteriosus*), as far as to the aorta, into which it opens below the left subclavian artery. The hypogastric branches of the primitive iliacs send only small branches to the pelvic organs, which are as yet scarcely developed; but they rise along the sides of the bladder and urachus, under the name of *umbilical arteries*, and proceed to the umbilical ring and to the cord. Unlike the adult, the fœtus also has an *umbilical vein*, which, upon entering into the abdomen, proceeds backwards and upwards, and somewhat from left to right, so as to pass into the longitudinal fissure of the liver, through which it passes, giving off here and there a branch to the right and left lobes of the liver. Having reached the under surface of the liver in the transverse

fissure, the umbilical vein divides into two trunks; one, which is called the *venous canal* (*ductus venosus*), and which, like the *ductus arteriosus*, grows smaller and smaller as the term of gestation approaches, appears to be a continuation of the primitive vein, and proceeds to open into the trunk of the vena cava, below the diaphragm; the other, which constitutes the right branch of the vena portæ, penetrates into the liver, where it at length anastomoses with the radicles of the hepatic veins, which, as in the adult, proceed to open into the vena cava a little above the *ductus venosus*.

568. *Course of the blood.* From the above arrangement of the circulatory organs, it is evident that the course of the fluids must be much more complicated than in the adult. From the smaller branches of the umbilical vein, the blood passes into the larger ones, and soon afterwards into the great trunk of that vessel; it then passes along the cord through the umbilicus, and divides beneath the liver into two principal currents, one of which follows the venous canal so as to go and be mixed with the blood of the inferior cava, while the other proceeds along the umbilical branch of the vena portæ, to be ramified in the right lobe of the liver, and taken up by the hepatic veins, which pour it into the trunk of the cava as it passes through the diaphragm. There it forms three columns; that of the venous canal, that of the hepatic veins, and that which is brought by the cava from the lower half of the body, which unite, and together enter the right auricle, thence passing through the foramen ovale into the left auricle; from the latter, the blood falls into the corresponding ventricle, which forces it along the aorta towards all parts of the body, but chiefly to the head and upper extremities, by means of the brachio-cephalic trunk, the left carotid, and the subclavian.

569. After losing among the tissues the nutritive principles with which it was charged, the blood is brought back by the jugular and the axillary veins to the subclavians, and thence to the superior cava, which also receives that of the azygos; the superior cava carries it to the right auricle, the auricle to the right ventricle, and the latter to the pulmonary artery, which directs only two small columns of it to the lungs, and causes the rest of it to pass through the arterial duct to the descending aorta, where it meets with a part of what the left ventricle had already expelled. That portion which reaches the primitive iliacs is in part distributed to the lower extremities by the external iliacs; but by far the largest portion of it returns along the umbilical arteries, through the cord, and at last to the placenta, whence it set out.

570. *In the heart.* Haller, Wolf, Sabattier, MM. Portal, Richerand, &c., supposed that the blood of the two venæ cavæ does not mix at all in the right auricle, that that of the ascending or inferior cava passes entirely to the left, and that of the superior cava entirely into the right ventricle.

571. Bichat was opposed to this view of the subject, and M. Magendie does not adopt it; it is difficult, say they, to understand how two columns of fluid can pass into the same cavity without being mixed together; the two auricles contract simultaneously, and not one after the other; it is not probable that the vivified blood furnished by the umbilical vein passes wholly to the superior half of the body, and that the venous blood alone is expended in the remaining moiety. But seeing that the vena cava inferior, surmounted by the Eustachian valve, seems to be continuous with the foramen ovale, rather than to open merely into the right auricle, and that the cava superior opens opposite to the orifice of the right ventricle, and on a plane which is rather in front of the inferior cava, it appears to me we may conceive that the blood of the two vessels may really pass into the left auricle and left ventricle, without necessarily mixing. The simultaneous contraction of the auricles does not seem to oppose this transfer; the blood of the inferior cava does not pass through the foramen ovale during the contraction of the organ, nor does that of the superior cava get into the ventricle during that action; if they are both full of fluid at the moment the systole commences, what is to prevent their passing it, without mixing, into the corresponding cardiac ventricle?

I believe, therefore, that Sabattier's theory is the best founded, and that only a very small quantity of the blood poured into the right auricle by the two cavæ respectively is mixed there.

572. However, it must not be supposed that the head and limbs receive none but the blood brought to the heart by the umbilical vein and its branches, nor that the abdomen and inferior extremities are nourished only by the blood of the superior cava; on the one hand, it would be absurd to suppose that that which is driven by the left ventricle into the arch of the aorta, passes on into the carotid and subclavian arteries, without some of it descending along the thoracic aorta; and on the other, even were that the case, this blood is no longer as pure as it was on leaving the placenta, for it is necessarily mixed with the venous blood of the lower extremities and abdomen. Further, the blood that passes along the aorta descendens is not merely the blood of the *ductus arteriosus*, but with it also is mixed that of the inferior cava.

573. *In the placenta.* Some persons have supposed that the blood brought back by the umbilical arteries is taken up by the uterine veins, and proceeds to be revived in the lungs of the mother, before returning to the ovum; others have thought that only a portion of it is absorbed, while the rest passes immediately into the capillaries of the vein; that there is in some sense two circulations, *one great circulation*, completely under the influence of the heart and lungs of the mother, and one *lesser circulation*,

the only one really belonging to the fœtus. What has been said above will, I think, suffice to cause such opinions to be appreciated at their just value; I shall content myself with remarking here, that in order to admit of what is called a *great circulation*, the pulsations of the fœtal must be isochronous with those of the maternal heart. But the mode of auscultation introduced by M. Kergaradec proves, as it had indeed been before remarked by Diémerbroeck, that there is no such isochronism, and that the fœtal heart beats one half oftener than that of a majority of women.

574. If it were true that the blood of the umbilical arteries is poured as pretended, into the placental sinuses, it evidently would mix with that of the uterine arteries, which, according to the same theory, is also deposited therein; if so, we must be compelled to believe that the absorbing mouths of the umbilical veins have the faculty of choosing the arterial blood out of this mixture, while the uterine veins take up only venous blood: such an idea is not to be defended. Besides, as the matter of injection, even the coarsest, passes with an astonishing facility from the arteries to the veins of the placenta without being effused on its uterine surface, it appears to me that we may with certainty conclude that the blood of the fœtus is not taken up by the womb.

575. This does not, however, imply that the blood from the arteries re-enters the umbilical vein without undergoing any changes; but rather, only that these changes, purely molecular, are effected in the placenta itself. This elaboration is not the less undeniable because its essence is not understood. It may be compared to that which is effected after birth in the general capillary system; and to that which occurs in the secretory organs and in the lungs themselves. The fluids of the ovum are brought into contact with those of the mother, and at that instant a change of principles is effected between them, as takes place in the bronchia between the atmospheric air and the venous blood of the lungs; but here all our information is limited.

576. *In the liver.* The truly enormous size of the liver during the intra-uterine life, long ago gave rise to the supposition that it was an organ of hematoxis, or that it modified the blood in some manner. M. Lobstein appears to be still of this opinion. Fourcroy says that if this modification does take place, it must consist in a kind of decarbonization and dishydrogenization. More recently still, MM. Prevost and Dumas thought they had observed that the first blood globules of the fœtus appeared in the liver. If, says M. Geoffroy de Saint Hilaire, the liver receives so great a quantity, and exhibits such a considerable size, it is that it may secrete a great quantity of bile, which being poured into the small intestine, occasions the formation therein of an abundant quantity of mucus that the fœtus digests, and on which it grows. Finally, Dr. Lee of London has just performed some new experiments, whence it results that the use of the liver is to secrete an abundant

albuminous and nutritive matter; that this substance fills the hepatic ducts, the duodenum and small intestines; while in the stomach we find only an acid fluid, and meconium in the large intestines.

577. Of these different uses, not one is matter of demonstration; those indicated by Fourcroy, M. Lobstein and M. Geoffroy, are even based upon mere suppositions, that are easy to overthrow; and although the theory of Dr. Lee and Dr. Prout is supported by some facts, it seems to be the dictate of prudence that we should wait before we decide, and admit that at present we do not know what influence is exerted by the liver on the fœtal blood.

§ III. OF THE RESPIRATION OF THE FŒTUS.

578. Air being indispensable to respiration, it seems quite natural that that function should have no existence in the fœtus; but on the other hand, as absorption of air or oxygen seems to be indispensable to the maintenance of life in all organic beings, attempts have been frequently made to prove that all animals respire during their fœtal life.

579. As to the human species, it has been said that the placenta receives oxygen from the blood of the mother at the same time that its own parts with certain heterogeneous principles, as, for example, a portion of its serum: this opinion, which is of an ancient date, has been latterly defended by MM. Lobstein, Meckel, and Muller.

It is true, that in order to explain the changes undergone by the blood in passing through the placenta, we may compare that work to respiration, but to accept such a comparison in the very letter, would be most strangely to wrest the analogies. The blood which re-enters the umbilical vein is doubtless modified, but it is not redder than it is in the arteries; the change it has just experienced does not, therefore, in the least resemble that which occurs in its passage from the pulmonary arteries into the pulmonary veins of the adult.

580. Some other persons, and particularly M. Geoffroy de Saint Hilaire, have admitted that the fœtus absorbs air or a vivifying gas from the whole surface of its body, by a kind of tracheæ like those of insects, or even by the pulmonary passages, which might in such case be compared to branchiæ, and that it respire after the manner of fishes; but I have already stated that the gas obtained by M. Lassaigue in his first experiments was only a compound of carbonic acid and azote.

581. Some, however, have persisted in maintaining that the lung exerts a certain action on the water of the amnios; that it separates air or some other principle from it; in a word, that it exercises a sort of respiration: on this subject reliance has been placed on some researches made in Denmark by Scheele, Wiborg, Winslow, Heroldt, &c.; experiments that tend to prove that the liquor

amni fills the trachea and bronchia of the fœtus; on those of Bécclard, who saw the same thing; and further, that the young of a bitch, still enclosed in the membranes, executed the motions of dilating and contracting the alæ nasi, and of the chest; lastly, on the fact that the fœtus has on more than one occasion been heard to cry while in the mother's womb.

582. But it has been seen, farther back, what ought to be thought of the presence of liquor amni in the gastric or pulmonary passages of the dead fœtuses. De Buffon and Autenreith, who got the fœtuses of animals to live in that fluid; Wrisberg and Oslander, who have both seen the human fœtus live ten and fifteen minutes out of the womb with the membranes unruptured, did not see the respiratory movement mentioned by Bécclard; I, too, had an opportunity, in 1825, of witnessing a fact that was very curious, and well adapted to illustrate this point; a woman at the *Hospital de Perfectionnement*, and who said she was six complete months pregnant, was suddenly delivered at five o'clock in the morning of the 23d of August; the ovum which came away whole, was received by M. Lafond, a resident student at the Hospital. The specimen was immediately brought to me, and I placed it in a large bowl of tepid water. The fœtus did not appear to be of more than five months and a half; I left the membranes whole; I carefully examined the nose, the mouth, the abdomen and thorax of the fœtus, which continued to live in this way for thirty-six minutes, but I discovered no motion in the thorax, except the slight throbbing occasioned by the action of the heart. We were also able to convince ourselves that the water of the amnios had penetrated neither into the trachea nor the stomach.

583. *Uterine vagitus*. As to the cries generally known under the title of vagitus uterinus, examples of it may be found in Albert Legrand, Libavius, Solinus, Camerarius, Sennertus, Bartholin, Deusingius, Velthusius, Boyle, and Needham himself; but these accounts being given only upon the hearsay of old women, do not deserve the trouble of being repeated. The subject has come up again in our own day: Oslander affirms that he heard these cries in two different women; M. Zitterland cites an instance of it which he himself witnessed, after having taken all proper precautions to avoid being deceived; MM. Henri and Jobert have observed the same thing at Paris, in an incontestable manner, in 1825, according to the report of M. Marc; M. Hesse has related a fifth case; and M. Lesauvage assures us that he very distinctly heard the cries of young puppies while still in their mothers' belly.

584. When the membranes are ruptured and the waters discharged, when the orifice is dilated, and the child's face engaged more or less deeply in the excavation, we may conceive, indeed, that the fœtus might breathe and utter some cries before its complete expulsion; but still the state of compression and constraint

of the thorax renders the possibility of such an occurrence very doubtful; but when the ovum is entire, as in the case given by M. Lesauvage, the fact is so improbable, that we are not authorized to draw any conclusions from it.

It is sometimes so difficult to avoid all the causes of error, all subterfuges, not to be deceived by strange and unexpected noises, such, for example, as are often produced by air in the intestines, that before we admit as positive a phenomenon which it is impossible to reconcile with the laws of physiology, the same person should have ascertained its existence repeatedly; in the mean time, I may say with Fontenelle, that, since learned and credible men have heard it, I will believe it, but I should not believe it if I had heard it myself.

585. Further, if the fœtus really breathed; if air passes through its lungs, they would be permeable and spongy, while at birth they are, as is well known, quite compact, and as heavy as a slice of muscular tissue.

§ IV. OF THE VIABILITY OF THE FŒTUS.

586. The word *viability*, derived from *via*, is employed in medical jurisprudence to express the possibility of passing through the various phases of human life. To render a child *viable*, it should possess at birth an aptitude to live independently of its mother; from this definition it will be perceived that a fœtus at term, as has been remarked by M. Billard, may be born not *viable*, provided it be affected with some faults of conformation, or with certain diseases, as also that a fœtus may be born *viable* although dead when passing from its mother's womb.

At what stage of pregnancy is viability possible? Although debated by accoucheurs and physicians in all ages and countries, this question has continued until this moment undecided. The fœtus which, according to some persons, is *viable* at four months and a half, does not, according to others, really enjoy viability until the seventh month.

587. The law having determined that a child born before the one hundred and eightieth day after marriage may, if it is pronounced to be viable, be disowned by the husband, implicitly declares that viability commences with the seventh month. As a legislative measure, this decision is extremely wise, and could not be more just; but it does not by any means prove that a fœtus is never *viable* before the end of the sixth month, nor that it is always so at the commencement of the seventh. The determination as to the viability of the child ought to depend on the degree of perfection attained by the fœtal organs, and not on the stage of pregnancy. But, as the evolution of the fœtus is not always in the same ratio, it follows that an eight months' fœtus may be less *viable* than one of seven months.

588. Should we refer on this head to the cases related by various authors, we might have examples of children that were infinitely small, of some born at four months or four months and a half, and nevertheless become robust and vigorous men. Who is unacquainted with the history of the celebrated Fortunio Liceti, related by Van Swieten? His mother, frightened by the roughness of the sea while passing from Reco to Rapallo, brought him into the world before the sixth month of her pregnancy; he was not bigger than a hand; his father had recourse to the heat of an oven to bring him up, and notwithstanding all that, Fortunio lived to be seventy-nine years old. An abortion, says Brousset, was born in 1748, at the fifth month of pregnancy, and lived to the ninth month, without sucking, without producing any excretion, or performing any other motion, save to swallow a few drops of milk; but, four months after its birth, it suddenly cried, and sucked, and moved its limbs, so that at sixteen months old it was stronger than children of that age commonly are. To be sure, one ought really to have been, like Brousset, a witness to such a miracle to be able to believe it. Thebesius also pretends to have seen a fœtus, born before the seventh month, which could not cry until the ninth, but which was still very weak after the lapse of a year. Pleissmann cites another such case, quite similar to that of Brousset, except that the fœtus was born at a more advanced stage of the pregnancy. The daughter of P. Soranus, according to Carden, came into the world at the sixth month: to nourish her they were obliged to pour milk into her mouth by means of a funnel, which did not prevent her from running a long career.* Millot, who, in the matter of proof, does not seem to be very difficult, speaks of a certain Julius Modié, born in the year V, at five months and a half, and who was so small and weak that at first he could not suck at all. This child, however, grew very well. Have we not also had, as proof of anticipated viability, the history of the famous Bébé de Nanci, who only weighed one pound at birth, whose first cradle was a *sabot*, says the Count de Tressan, and of which there is a wax model in the cabinets of the School of Medicine at Paris. But I ask, what conclusion can we draw from observations so imperfectly substantiated, from facts encompassed with so many marvels, and citations so improbable?

589. While admitting with Chaussier, M. Orfila, and some others, that none of the facts related by the authors demonstrate beyond reply that the fœtus is *viable* before the seventh month, I

* Spigelius speaks of a man who was born at the commencement of the sixth month, and who was obliged to be kept wrapt up in cotton for more than six weeks. Montus says that the cup-bearer of Henry III. was born at five months; Avicenna, Diemerbroeck, Vallesius, and Mena speak of facts nearly similar, and quite as authentic.

cannot, however, agree with them that the thing is impossible. A woman came in 1825 to be delivered at my amphitheatre, after she had had a fall; her last child was six months and three days old; she supposed herself to be only five months gone with child, and if she had had commerce with her husband fifteen or even twelve days after her lying-in, it was at any rate impossible for her to have entered on her seventh month. Now this woman brought into the world a little girl that weighed two pounds, which besides presented all the appearances of a fœtus of about five months, whose cries were so weak they could scarcely be heard, who notwithstanding breathed, and lived in this state for four days.

590. In the course of the same year, a young woman miscarried at the *Hospital de Perfectionnement*; having been delivered of a child at term five months and twelve days before, in the same hospital, it was impossible for her to be more than five months pregnant. The fœtus she brought forth weighed only one pound and a quarter, its skin was of a bright rose-colour, and had on it no down nor sebaceous matter; its length from the vertex to the sole of the foot was only nine inches. Notwithstanding this, my attention and that of the pupils was attracted to it by some stretchings and slight movements of its limbs; we wrapped the delicate creature in cotton, and placed it near its mother, who was told to pour a few drops of milk into its mouth from time to time; but as she thought such an abortion could not live, she did not judge it proper to do any thing to prevent it from dying. It expired in fact the next morning, twenty-eight hours after it was born.

591. My object is not by any means to maintain that these fœtuses were *viable*; I merely wish to show that it is not strictly correct to say in a positive manner, that a child born previously to the last three months of the pregnancy must be reputed not *viable*.

592. A fœtus is *viable* when sufficiently developed to move its limbs, and when it really does move them; when it cries and breathes freely; when its head is covered or begins to be covered with hair; when its skin is no longer transparent, is covered with down and coated with sebaceous matter; when the bones of the cranium touch along the greater part of their edges, and the sutures and fontanels are consequently very much closed; when it passes off its meconium and urine; when the proportions and dimensions of the different parts of its body are not too far removed from what is observed in fœtuses at term: and not because it is exactly seven months old or more. For the same reason it ought not to be declared not *viable* because it is born before the three last months of gestation, but rather because the absence of its cry, a respiration scarcely discernible, very feeble motions, inability to take hold of the nipple or finger, to void its meconium and urine, softness and

separation of the bones of the head, the absence or fewness of hairs, the transparency and red colour of its skin, the want of a sebaceous deposit, the thinness of its nails, &c., prove that its organs are still far from the degree of perfection necessary for the maintenance of its exterior life.

593. Hippocrates and many other physicians of antiquity taught that the fœtus is more *viable* at seven months than at eight. At first view, such a proposition appears somewhat absurd; all other things being equal, a fœtus likely to live at the seventh month, will, *a fortiori*, be *viable* if not born until the eighth month. The very strong movements of the fœtus about the seventh month, and which gave rise to a belief in the somerset, rendering premature delivery much more common at that period than at any other, the ancients drew from it the conclusion that the seventh month is a natural term of pregnancy, and that if the fœtus over-passes that, it could not be born without danger until the end of the ninth month. It is difficult to understand how they should have made a double mistake on this subject, unless, with M. Dubois, we admit as a fact, that if labour takes place in consequence of the lively agitation of the fœtus, as pretty often happens at the seventh month, the cervix dilating with its accustomed gentleness and regularity, the child will be exposed to less risk than if born at eight months, when delivery is provoked by a fall or some other external accident. In the former case, in fact, early parturition is in some sort natural, while in the latter, it is only a kind of abortion.

ARTICLE III.

OF ABNORMAL EXPULSIONS OF THE HUMAN OVUM.

SECTION I.

Of Abortion.

594. When the expulsion of the ovum takes place within the first six months of pregnancy, it is called an abortion, miscarriage, or *blessure*.

According to Aristotle, "if the fœtus comes away before the seventh day after the conception, the accident is called a show; at a later period, but before the fortieth day, the woman is said to be *wounded*." In the former case it is an *efflux*; according to Bonacciolus, *effluxiones, quæ intra diem septimum*; in the latter it is an *aborsus*; *aborsus quæ primis mensis*; or an *abortus*; *abortus*

quæ intra quadragesimum. But these arbitrary and insignificant distinctions have been neglected for a century past, both by physicians and accoucheurs.

595. *Frequency.* In twenty-one thousand nine hundred and sixty cases of pregnancy, Madame Lachapelle informs us that she observed one hundred and sixteen abortions. According to that author, miscarriages are more frequent at six months, then at five, then at three, than at any other period of gestation. M. Désormeaux, in accordance with almost all the ancient authors, with reason, and with my own observation, thinks, on the contrary, that it is the more common as pregnancy is less advanced. If Madame Lachapelle mentions a different result, it is evidently because abortion in the early periods does not occasion so much inconvenience to women as to cause them to go to the hospital; which is not the case after the first half of pregnancy has been passed through; or perhaps because in the first six weeks, the ovum and the embryo, frequently confounded with clots of blood, occasion the woman to suppose that she has only had a return of the menses, while at a later period she cannot make such a mistake.

596. Morgagni was of opinion that he had noticed more abortions of female than of male fœtuses: M. Désormeaux is of the same way of thinking, and says that if the vulgar think differently, it is owing to the circumstance, that in the early stages it is very easy at a first glance to mistake a girl for a boy. This remark, which had been previously made by Morgagni, is very just, provided it be applied only to the first two or three months. Madame Lachapelle has seen more female than male embryos, and more male than female fœtuses. Upon the whole, abortions of females seem to exceed those of males in proportion to the nearness to the period of conception; and if it were true, as it is in Germany said to be, that the two sexes are at first confounded, or that the creation of the female sex depends merely upon an arrest of the growth of the genital organs, the female abortion ought to be the only one at the early stage.

597. *Causes.* It appears that the causes of abortion have been till lately but ill understood, and the labours of M. Désormeaux, of Madame Lachapelle, of M. Dugès and Madame Boivin could not have come more opportunely to throw some light upon this matter. They may be divided into remote and proximate causes; or into efficient and determining causes. The proximate or efficient causes are constituted by the contractions of the womb, assisted by the muscular efforts of the woman; the determining causes may be divided into predisposing and occasional.

The *predisposing causes* may be connected with the state of the woman or of the ovum; relatively to the woman, some of them depend on certain general dispositions of the economy, and others on a special state of the sexual organs only.

598. *General state.* Women who are plethoric, who menstruate abundantly and regularly, who are irritable, excessively sensitive, nervous, hysterical, lymphatic, of a fair complexion, weakly, sickly, who have large eyes and a *bluish sclerotica*; persons affected with syphilis, scurvy, rickets; those who have a badly formed pelvis, some organic lesion, or any chronic disease; those who are asthmatic, dropsical, affected with cancer; those who are badly nourished, and those who compress their bellies by lacing, or wear their clothes too tight, miscarry more frequently than others: and the reason of it may be easily conceived. Marshy and unhealthy countries; certain atmospheric constitutions, formerly mentioned by Hippocrates, and frequently observed since his day, and which render abortions really epidemic at some seasons; watchings, and fatiguing occupations are also classed among the predisposing causes of miscarriages.

599. *Affections of the sexual organs.* On the part of the sexual organs these are, all the chronic diseases to which they are subject, adhesions, deformity, displacements; alterations, whether scirrhus, encephaloid, or hydatiform; sub-inflammation of the ovaries and all the disorders that it occasions; organic alterations of the Fallopian tubes; fibrous, polypous or other productions in the tissue of the womb itself, or the neighbouring parts; preternatural adhesions of the broad or round ligaments, or of the tubes or ovaries to the surrounding parts, or to each other; chronic metritis and all its consequences; anteversion and retroversion; scirrhus and cancer; transformations and affections of whatsoever nature; in fine, whatever may interfere with the easy and regular enlargement of the womb during pregnancy.

600. This genus of causes, formerly noticed by several authors, amongst others by M. Delpech, has lately been well discussed by Madame Boivin in a memoir *ad hoc*, which in fact deserves the attention of every accoucheur; its mechanism and frequency may be easily conceived of by reflecting on the affections that take place in a multitude of women at the period of puberty, before or after the occurrence of that revolution, and indeed at all periods of their lives; affections that are most generally occasioned by a material lesion of some portion of the generative system; and do not commonly disappear without leaving behind them the indelible traces of their existence. Sometimes it is a tumour in the excavation that prevents the enlargement of the uterus; at others it is an ovary that has degenerated or been transformed into a cyst, and become lodged in the recto-vaginal fossa, a case of which came under my own notice; sometimes the right tube is glued to the ligament of the left ovary, and *vice versa*, and even, besides, so as to adhere behind the cervix, of which I saw an instance in a woman who died when about three months gone with child; more frequently, there are encephaloid and scirrhus masses, either

occasioned by the pregnancy, or whose germs existed previously to the conception, which, by affecting the ovaries, the tubes, the pelvic peritoneum, or the substance itself of the womb, oppose an invincible obstacle to the changes of structure and dimensions indispensable in these organs for the completion of gestation, of which I have collected pretty numerous examples, &c.

601. Leucorrhœa, hydrometry, irritability; too great a degree of contractility; rigidity of the fibres and even of the vessels, and if we may believe Hauenschild and Loder, of the peritoneum of the uterus; and a laxity or atony of its neck, (on which M. Désormeaux rationally insists,) are also admitted among the number of the predisposing causes of abortion; but for the most part their action is far from being so evident as the preceding. The same may be said of a want of extensibility of the uterus, occasioned by a too great firmness of its fibres, a firmness on which many authors lay so much stress. According to their statements, abortion is to be feared because the womb does not yield with facility to the effort which tends to distend it. In this respect their language, always similar to that of the ancients, who supposed that the ovum acted mechanically upon the womb, would lead us to suppose that there is a sort of contest between the containing and the contained; however, nothing of the sort takes place: the womb enlarges in consequence of the unfolding of its fibres, and the affluxion of fluids into its vessels; the ovum ceases to grow as soon as the organ that contains it ceases to develop itself, and abortion may follow as a consequence thereof, but without our being able to accuse a distending power which it by no means possesses.* By rigidity of the uterus we ought to understand a

* M. Velpeau asserts here that the growth of the womb depends upon the affluxion of fluids into its vessels, and denies virtually that the growth of the ovum is the cause of that of the uterus. I do not pretend to know by what means the liquor amnii is formed; but it is evident that the development of the fetus, and the increase in quantity of the liquor of the amnios, are the causes of the enlargement of the organ that contains them: that that organ enlarges because of their enlargement; and that it ceases to augment its capacity when they cease to increase in bulk.

The womb contracts soon after the rupture of the ovum and discharge of the waters. This contraction takes place at any period of pregnancy when the waters are broken—is not this evidence enough to show, or rather prove that the womb depends for its increase, not upon a power inherent in its own tissues, but upon an antagonist force, to wit, the force which augments the bulk of the child, while it at the same time distends the membranes more and more by daily additions to the stock of liquor of the amnios?

I do not agree with M. Velpeau in the sentiment which he has expressed. I prefer to regard the ovum as an independent existence; which, like a parasite, draws its materials of subsistence from the surfaces to which it may be attached, and which compels those surfaces to augment *pari passu* with its own necessities as regards space, and surface for absorption. For an expression of my opinion on this subject see the *Philad. Pract. of Mid.*, p. 104.—M.

want of disposition in it to imbibe, to soften and distend, in consequence of the accumulation of fluids in the interstices of its tissue, and not any resistance it may oppose to the swelling of the ovum.

602. *Diseases of the ovum.* The foundation of an abortion in a majority of cases is laid in some peculiar disposition of the ovum itself, and I am astonished that authors have paid so little attention to this predisposing cause: like fruits that perish before they have attained their full growth, and separate and fall at the slightest shake of the branch on which they grow, so the embryo or the fœtus in animals must become detached and soon afterwards expelled from the womb when it has ceased to live.

603. The alterations capable of bringing about the death of the fœtus are extremely numerous, and so much the more so, in proportion as the pregnancy is advanced. Since I began to pay regular attention to the subject of embryology, I have carefully observed one hundred and fifty products that had not gone beyond the term of three months; now I can assert that of this number at least one half were diseased.

604. Sometimes the disease commences in the membranes; the chorion thickens, becomes opaque, and is covered with rugosities on its internal surface; the granulations on its external surface swell, and give birth to hydatids in bunches in the womb, and to the hydatiform mole, which Madame Boivin erroneously regards as a dependency on the amnios, &c.; the latter undergoes alterations that are nearly similar, is disorganized, or contracts adhesions with the surrounding parts; the placenta is not formed, or is irregularly developed, is transformed into hydatidic granulations, and becomes the seat of all sorts of degenerations.

Sometimes, and perhaps most frequently, the disease attacks the umbilical vesicle or its duct; in others it affects the cord or the embryo itself, and in this respect the forms and degrees of the alterations are exceedingly various.

605. Almost all the diseases to which the child is liable after birth, may manifest themselves during its intra-uterine life. In an embryo of two months I have seen adhesion of the whole length of the members to the trunk, I have seen ulcerous destruction of the head, belly, hand, &c., in subjects quite as young as the above-mentioned; also, manifest alterations in the lungs, the liver, the peritoneum, and other parts of the body, as early as the third month; I have found the umbilical cord in a state of atrophy, and its vessels either quite or almost obliterated, at every stage of its development. In several specimens the umbilical vesicle was hard, and, as it were, stony; in others it was full of a clear limpid fluid, and in two cases it was not of a natural size, nor had it the other appearances that naturally belong to it. In some embryos the head alone was atrophied and deformed; in others the same

state was observed in one or more of the limbs, the breast or the belly; most commonly, the atrophy, or the disorganization is general, and in some cases the embryo at last wholly disappears. In such instances the amnios is most commonly destroyed also; I have many times found the ovum a mere sac, filled with an albuminous, limpid and viscid fluid; I could almost believe with Walter, Burns, Béclard, and M. Dugès, that such ova, composed merely of the caduca and chorion, had never contained an embryo; that they might be compared to those eggs without germs, that are laid by pullets, that have never been fecundated by the cock; but as in several of them there were still to be found the traces of an amnios, an umbilical cord, or of the fœtus itself, it was necessary to renounce such an idea at once.

606. I have, besides, certain proof that most of the cases of monstrosity, even those which in our times are so complacently accounted for on the theory of an arrest in the process of evolution, are nothing more than the results of diseases in some part of the ovum; but I reserve the development of these assertions for another work; let it suffice to remark in this place, that the human embryo, a mere vegetable during the first months of pregnancy, is surrounded with too many causes of destruction to be able always to resist them successfully; that nothing ought to be more easy to ascertain than the disease and even the death of a being whose existence is so frail and precarious; and finally, whenever the ovum is diseased to such an extent as to cause the death of the embryo, abortion is in some measure one of its necessary consequences.

607. I will not, with Madame Lachapelle, say, that after the death of the fœtus, the womb becomes the seat of a congestion, because the blood, which previously passed into the placenta, surcharges it by stagnating in its vessels; nor that this embarrassment, definitely, is the cause of abortion. Such a supposition does not appear to me to be tenable, and I should not have alluded to it, had not M. Désormeaux seemed to lend it a new force by the strength of his authority. As soon as the ovum ceases to live, it becomes only a foreign body in the uterus; thenceforth the organism tends to throw it off, as it does whatever interferes with its operations, as a thorn, for example, but not because the blood primarily destined for the fœtus is compelled to re-enter the torrent of the maternal circulation.

608. Weakness of the fœtus, its convulsive motions, the superabundance, or too small quantity of the liquor amnii, circulations of the cord around its neck, &c., knots in it, its shortness, its excessive length, cysta, or any accumulations of fluids between the membranes, effusions of various kinds, whether diffuse or circumscribed, in the substance of the placenta or caduca, are also

causes capable of bringing on abortion, but not inevitably, like the affections I spoke of just now.

609. *Occasional causes.* The predisposing causes alone would very rarely fail to bring on the expulsion of the ovum ; they in fact frequently do produce it, and in these cases the abortion is said to be *spontaneous* ; however, it is almost always attributed to some accident, some particular circumstance, which, in the eyes of the public, and even of many physicians, passes as the only and principal cause of it. The generality of people being unable to conceive, and professional people having scarcely imagined that the principle of abortion might reside in the ovum itself, it has followed that a thousand insignificant causes have by turns been brought to its explanation ; that the slightest actions, those capable of effecting the smallest change in the economy, have been classed amongst its occasional causes.

610. Such, for example, among others are yawning, pandiculation, the act of going to stool, of voiding urine, of coughing, great exertions, disappointments, joy or grief, the odour of the snuff of a candle, the impression of any strong odour whatever, an hysterical fit, epilepsy, *coitus*, dancing, sleeplessness, diarrhœa, tenesmus, and all the causes that might occasion uterine hemorrhage during pregnancy.

611. I do not wish to be understood, however, that none of these causes may give rise to abortion ; but only, that without the antecedent existence of one of the predisposing causes above enumerated, they would scarcely ever determine it, and that they most commonly are merely coincidences. The same may be said of the acute diseases of the woman, of asphyxia, of all sorts of inflammations, of crying, of singing, of the jolting of a carriage, of vomiting, of the use of certain medicines, of falls, blows, violent motion of what part of the body soever, of any thing that might shake or shock the uterus.

612. It has been generally thought that these causes act by *detaching the placenta* : but when it is remembered that the ovum fills the womb exactly, and is itself perfectly filled with the liquor amnii and fœtus, it is evident that motions impressed on the womb by external shocks are as incapable of separating the placenta from the womb, or the chorion from the amnios, as they would be to separate two bladders, one contained within the other, and the inner one full of fluid ; the most active and imprudent women, those who give themselves up to the most violent exercises, do not on that account, fail, most generally, to go their full time ; while many others are found to abort in spite of the most minute precautions, and the most persevering attention. A woman, says Mauriceau, who was seven months gone with child, in order to escape from her chamber, which was on fire, got out of a third story window ; fear soon made her let go her hold, and she fell

on the stones, and fractured her forearm, but her pregnancy was not disturbed. A young midwife mentioned by Madame Lachapelle, who was pregnant, and affected with deformed pelvis, threw herself from the top of a stair, into a deep cellar, with a view to bring on abortion, and thereby avoid the Cæsarian operation; she died a few days afterwards of her wounds, but there was no abortion.

613. *Medication.* Blood-letting, baths, emetics, purgatives and emmenagogues also enjoy a great reputation among the women, as abortives, which happily is but little deserved. Diseases are daily met with in practice which require repeated bleedings, whether general or local, and for which the tartar emetic is administered, as well as drastic purgatives and other equally active substances, without the pregnancy seeming to suffer from them. Mauriceau speaks of a woman who was bled from the arm eighty-six times in one pregnancy, and who notwithstanding was at the end of it delivered of a fine large child; he mentions another who was bled from the foot ten times without experiencing any inconvenience. Delamotte has seen the most powerful evacuants produce gastritis, enteritis, peritonitis and even death itself, without being followed by the expulsion of the ovum. I had the care of a young person who, with a design of concealing the proofs of her dishonour, had produced a violent abdominal inflammation by taking medicines to promote abortion; she died on the eighth day without any symptom of abortion having appeared. I was consulted for another person, who had, with the same view, taken fifteen grains of tartarized antimony; it produced most violent efforts at vomiting, but the progress of the pregnancy was not interrupted.

614. It ought not, however, to be concluded from the above facts that blood-letting, particularly from the foot, or the application of leeches to the vulva, or that baths too frequently repeated, &c., can never be injurious to pregnant woman; I merely wish to say, that except in case of some peculiar predisposition, these measures most commonly produce no effect, and that they may be had recourse to, if circumstances require them, just as if the woman were not pregnant.

615. M. Désormeaux has already pointed out the fact that abortion is frequently preceded by a state of irritative congestion of the uterus, a general febrile excitement, the train of symptoms which constitute the *molimen hemorrhagicum*. Very recently Madame Lachapelle and M. Dugès have strongly insisted on this condition towards which, in fact, almost all the predisposing and occasional causes of abortion tend previously to bringing into play the contractile powers of the womb; but it was an error to regard it as the primitive cause of almost all miscarriages; it is commonly only a secondary phenomenon, an effect of some other

external or internal cause, and not a necessary result of any of them; however, there are some women who exhibit it in an evident manner at each menstrual period throughout the whole course of gestation; whence it follows, that it may suffice to detach the ovum, especially within the first three or four months, and that Klein, as approved by M. Désormeaux, Madame Lachapelle and M. Dugès, had a right to say, that abortion is never more common than during the menstrual periods; besides, it plays in this case the same part it does in the causation of floodings.

616. *Periodical* abortion, or that which in the same woman recurs at nearly the same period from conception, is one which appears to be most evidently connected with a menstrual or spontaneous *molimen*. It may, however, also depend on a special state of the womb, either congenital or acquired; for example, upon the womb being incapable of distension beyond a certain degree. On this point the influence of habit or hereditary constitution is commonly referred to; the cases of many women are cited whose mothers were subject to abortion, and never able to carry a fœtus to full term. Observation has proved that miscarriage is so much the more to be apprehended in proportion as the individual has been previously subject to it; the case is mentioned of a young girl who, having by criminal methods several times procured abortion of her fœtuses, could never carry one to the full term after she became a married woman.

617. The *mechanical* causes, or certain *manœuvres* recommended by some authors, in cases of deformity of the pelvis, and which, in the midst of our refined society, are also employed by degraded wretches not less criminal than the unnatural women who are not ashamed to submit to their disgusting ministrations, must be arranged amongst the same class with emmenagogues and drastic purgatives. Those who make use of them most frequently fail of attaining their object, and succeed only in seriously injuring the womb. I once prescribed for a female, in whom such attempts had brought on a flooding which conducted her to the verge of the grave; she suffered horribly from pain in the interior of the pelvis for two months, notwithstanding which abortion did not take place, and she is now a prey to a large ulcer of the neck of the womb. I opened the body of an unhappy creature who suffered from the like attempts, which did not succeed any better than the one above mentioned. M. Girard of Lyons mentions a similar instance. Very recently, also, (October, 1828,) a young woman who became pregnant against her wishes, succeeded by such manœuvres only in producing an organic lesion of the uterus, which, after frightful sufferings, led her to the commission of suicide.

618. *Signs*. After protracted disease, and within the first two or three months, the expulsion of the ovum is often effected without being accompanied by any particular symptoms, and does not

sensibly differ from what takes place at a somewhat painful menstrual period. But at a more advanced stage it can only give rise to the ordinary phenomena of a natural labour; yet it is most commonly preceded by lowness of spirits, a general depression, by lipothymia, syncope, a feeling of coldness in the epigastrium, palpitations, paleness, fetid breath, flaccidity of the breasts, and a major part of the rational signs indicative of the death of the *fœtus*. Ordinarily, as has been before remarked by Roderic à Castro, MM. Foderé and Désormeaux, Madame Lachapelle and M. Dugès, the woman at first, for one or more days, has rigors, horripilation, a hot skin, thirst, want of appetite, increased movements of the heart and arteries, a feeling of weight in the pelvis, about the fundament or loins, and a general lassitude of the limbs, as if threatened with some severe disease; next appear hemorrhage, accompanied with pain of greater or less severity, and all the symptoms of real labour; but, amongst all these signs, scarcely any, saving hemorrhage* and pain afford any certainty previously to the dilatation of the cervix, and the presence of a portion of the ovum in the upper part of the vagina.

619. *Hemorrhage* itself is not invariably followed by abortion, as is proved by the observation of Mauriceau, Raymond, de Boër, &c.; nevertheless, there is good reason to fear it when that symptom once takes place. But before we accord to it any value, we should know how to distinguish it from the menstrual discharge, which sometimes continues throughout the whole of pregnancy. I have already at another place (312) hinted that this discrimination is at the beginning very difficult, and must here repeat that this kind of abnormal menstruation, to which Madame Lachapelle appears not to give much faith, is notwithstanding not of very rare occurrence; I could add two instances to those related by Portal, Deventer, Amand, Baudelocque, &c., and I can affirm that in these two women the *catamenia* had never occurred with greater regularity.

620. As to the *pains*, it is important that they should not be confounded with the colic, or with those uterine pains that are also occasionally met with during menstruation; for this end, reference should be made to the signs indicated in regard to the pains of labour.

* A patient under my care lost in the fourth month, by uterine hemorrhage, more than twenty ounces of blood in the course of one day and a half, notwithstanding which, she continued to the end of the ninth month in tolerable health, and then gave birth to a very healthy child. It is certainly a very rare case, to meet with a patient who does not miscarry after losing four or five ounces of blood, as early as the end of the fourth month.

I have now under my care a patient in the sixth month, who has had several very considerable attacks of hemorrhage, and who has not been without more or less of a show for two months past: the placenta is not near the cervix uteri, and the child, as learned by auscultation, is in good health.—M.

621. The discharge of a certain quantity of brownish matter, or of serosity, the softening of the cervix, the rupture of the membranes, the formation of the *bag of waters* with pains extending from the navel towards the excavation, constitute the most conclusive signs of miscarriage; nevertheless, M. Désormeaux has known all these signs to be present after a fall, and yet abortion did not ensue. M. Morlanne relates the case of a woman who was not delivered until six weeks after the discharge of the waters; there has also been recently mentioned the case of a woman six months gone, in which the bag of waters was formed, and then ruptured, so that the arm of the child engaged in the vagina; after which the labour was arrested, the fœtus returned to its proper position, and the pregnancy proceeded in its natural course! The author of it saw and felt: we must believe him.

622. The *fluid* that escapes from the cervix may besides come from an hydatid cyst, or from between the membranes; in such a case it is very evident that the pregnancy might not be necessarily disturbed; it may also proceed, in double pregnancy, from the rupture of one ovum, while the other may not suffer the least alteration; but with the exception of these anomalies, it appears evident that the rupture of the membranes, followed by the discharge of the waters, positively indicates miscarriage, or at least the death of the fœtus, if it is not soon expelled.

623. The *child having ceased to live*, is generally soon thrown out by the uterus; but in some cases, its expulsion does not take place for a pretty considerable period. I have seen it not take place until the twenty-eighth day in a woman who was seven months with child. In another woman, the pregnancy, which was ascertained by *ballottement*, and active motion of the fœtus, suddenly stopped at six months; all the signs of the death of the child supervened; the belly gradually lost one half of its size; from this period eight months elapsed; the cervix remains closed, and nothing indicates that miscarriage is about to take place soon. M. Prout gave me an opportunity of seeing a fœtus of from three to four months, which was not discharged for five months after the first symptoms of abortion, and numerous authors have mentioned similar instances.

If the membranes are not broken, and the air does not get access to their interior, the fœtus may be preserved without change for several months, or even several years, which has given rise, I presume, to the supposed pregnancies of fifteen, twenty, or thirty months' duration, &c., that are spoken of in the scientific collections. This occurrence is met with, particularly in compound pregnancy: one of the fœtuses dies at two or three months; the other continues to grow; and at the lying-in, the practitioner is astonished to receive both a full-grown child and an abortion. I am in possession of a great number of facts of this sort; MM.

Bouvier, Colombe and Defermont have each communicated one to me, and many of the instances of superfœtation that have been most insisted on, are nothing more than such as these.

At other times it is decomposed, putrefies, passes into the state of adipocire, and then the pregnancy goes on as indicated when we were upon the subject of extra-uterine pregnancy (363). In the first months it may become atrophied, and when the ovum is thrown off, only exhibit the dimensions of an embryo of four or five weeks, although the woman was three or four months gone. It may also dissolve in the waters, and then the ovum is found to be transformed into a real mole. If the membranes give way, the fœtus generally escapes first, and the membranes follow soon afterwards. M. Trelat, however, has seen a case in which the fœtus was not discharged until twelve days after the expulsion of its involucre.

624. Although the fœtus may no longer be in the womb, its coverings may still stick there by means of some adhesion, and continue to live and grow. The caducous membrane soon acquires a considerable degree of thickness; the amnios disappears; the cavity of the chorion by degrees contracts, and the mass comes at last to be a reddish fleshy tumour, in the centre of which is most commonly, but not always, found a small serous cavity. In this way are formed most of the *fleshy moles* or *moles of generation*. The placenta may continue to grow alone, or it becomes infiltrated, and when at last it is expelled, it exhibits no resemblance to its original form or nature.

625. Sometimes the ovum comes away whole; indeed, this is most frequently the case until the end of the second month; but after this its size does not admit of its being so expelled, in a majority of instances, and so much the less, as the gestation is at a more advanced stage; however, I saw an ovum of full six months expelled at the *Hospital de Perfectionnement*, which was not in the least broken. M. Larrey sent me another of five months and a half, which was also quite whole. In the first months of pregnancy; instead of coming away with all its appendages, the fœtus is sometimes expelled with the amnios alone, or with its amnios and chorion only.

626. *Prognosis.* A miscarriage is generally more dangerous than a labour at term, and those authors have erred who find fault with Hippocrates for having uttered this opinion; the former is a disease, while the latter is only the termination of a natural function. But to speak correctly, abortion is sometimes not such a serious matter in itself considered, but because the causes which induce it and the accidents which accompany it generally constitute important diseases; because the pregnancy, which is terminated by it, has recalled to the genital organs the germ of affections whose existence was not suspected, or which perhaps would have

never reappeared but for it. The prognosis ought, therefore, to vary according to circumstances. If it appears to draw in its train a variety of nervous affections, pains in the hypogastrium, chronic inflammation of the womb, ulcers, degenerations, and all sorts of organic lesions, it frequently is so because these alterations existed previously to the miscarriage itself; excepting always those cases of abortion produced by the direct agency of mechanical causes.

627. The least dangerous abortion is that which is determined by a disease of the ovum, and the most serious is that which a violent occasional cause, unaided by any predisposing one, has given birth to; moreover, all other things being equal, a spontaneous abortion is less to be dreaded than a forced one, and in general, so much the less, in proportion as it is effected with gentleness: the danger, which for the woman is greater in proportion to the degree of advancement of the pregnancy, is, for the fœtus, the same at all stages of the gestation.

Where the cervix is naturally soft and relaxed, while the rest of the womb retains its ordinary density, the miscarriage is both easier and less serious to the woman than in the contrary circumstances; when produced by a very decided *molimen*, if there are no complications, it may terminate as favourably as the most simple case of parturition; but as this hemorrhagic effort is, most frequently, merely the first degree or the symptom of a more or less extensive inflammation, there is reason to fear, especially if fever attends it, either a metritis, an acute peritonitis, or some other phlegmasia equally dangerous. Some authors have contended that abortion may have its advantages, as, for example, to render menstruation regular, or restore fecundity; but it is evident from her miscarrying, that the woman was not sterile; and besides, if the menses sometimes resume their original type after an abortion, they would have done so with more certainty after a complete pregnancy.

628. I can conceive of only one case in which abortion could be of advantage by being frequently repeated, and that is where the womb is not sufficiently permeable, or too dense to dilate in proportion to the wants of the ovum; then one miscarriage must necessarily diminish this abnormal rigidity a little; a second one diminishes it still more; and finally, a third or a fourth may completely overcome it so as at last to render it possible for the woman to conduct the fœtus to delivery at full term.

Treatment. The practitioner should turn his attention to the prevention of miscarriage, for when it has once commenced, all he has to do is to hasten its termination.

629. The *preservative treatment* must necessarily vary according to the nature of the determining causes we have to remove or combat: if the woman is irritable and very sensible, we must

do all in our power to protect her from moral commotions; she should be kept out of large cities; traveling should be recommended to her for change of scene, &c. Those who are weakly and lymphatic, should follow an analeptic regimen, and keep quiet, or at least engage only in agreeable exercise: in some cases a tonic medicine may be administered. Should there be a disease of the uterus or of some other organ, its nature should be carefully inquired into, so as to apply the suitable remedy. When signs of plethora or of congestion are present, blood is to be taken from the arm, which may be repeated once or oftener, if circumstances require it, particularly in women in whom each menstrual period is marked by an evident *molimen*.

Bleeding is certainly one of the best means of preventing abortion; but it would be dangerous to conclude with the vulgar, that it is useful in all pregnancies indiscriminately; where no particular circumstance calls for it, it may be injurious to pregnant women as well as to other persons, and too much fault cannot be found with the habit that some fall into of being bled once or twice during their pregnancy without knowing whether there is any real need for it or not.*

630. As soon as the signs of abortion become manifest we ought to act in the manner I shall point out in the article on uterine hemorrhages; in general the most absolute rest, horizontal posture, cold acidulous drinks, external revulsives, applications of ice itself, and antispasmodics and composing medicines, if there are any agitation and tendency to convulsions, will be successively tried; blood-letting is still the most powerful resource to be made use of, but nevertheless it is not to be employed without reserve and caution, for as it does not always prevent miscarriage, it is liable to be charged with the production of an accident which it was impossible for it to prevent; bathing the feet and the hands, and the whole bath, should be avoided while there is any hope remaining of being able to avoid the expulsion of the ovum; otherwise they may be used with advantage.†

* Dr. Physick told me that he was accustomed to order an anodyne enema every night at bed-time for such of his patients as were prone to abortion.—Fifty drops of laudanum and a wineglassful of flaxseed tea were thrown into the rectum regularly at night, with a view to obviate any too great tendency to uterine contraction. I have in several instances happily succeeded in conducting the woman to full term by this method of treatment—I have also sometimes found it to fail.—M.

† Some delicate females of leuco-phlegmatic temperament and great nervous irritability, are subject to *habitual* abortion, which ordinarily takes place during the early months of gestation.

At the return of every menstrual period, regular periodical uterine pains come on, threatening a premature birth. The following plan of treatment has been attended with great success. I direct the patient,

631. Where the hemorrhage is of an alarming character, we have a precious resource in the *tampon*, which has been too much neglected by the moderns; it not only often arrests flooding, but besides this, it does not always hinder pregnancy from going to its full term, as noticed by Gallandat, M. Désormeaux and Madame Lachapelle. Denman, Kok, and Kluyskens have spoken highly of its employment in such circumstances; and like M. Hervez de Chegoin, who makes frequent use of it, I for my part, have nothing to say except what is wholly in favour of its employment. Perhaps also the *ergot* might be efficacious in such cases; but as it favours the expulsion of the ovum, it would not be prudent to make use of it until after having tried all other means. Finally, when abortion is once decided, it requires the same care as hemorrhages, properly so called, or as convulsions.

632. To promote the *expulsion* of the product of conception, when the impossibility of retaining it in the womb is once ascertained, we continue the use of the same means; if the woman is strong we recur to blood-letting; but rest and the horizontal posture are less indispensable; baths and *ergot* may be administered without fear. Opium administered internally if the pains are very strong; sedative ointments, or ointment of belladonna applied to the cervix, if that part is painful, and in a state of spasmodic constriction; and emollient injections into the vagina may be of use

as soon as threatening pains come on, to go immediately to bed, and to have a dozen or more cups applied over the loins and sacrum; sometimes scarifying two or four, so as to take away from two to four ounces of blood, according to circumstances, administering at the same time an anodyne enema, consisting of two ounces of flaxseed tea, or a watery solution of starch, and from forty to a hundred drops of laudanum, according to the urgency of the symptoms, and the capacity of the patient to bear narcotics. At the same time, the foot-posts of the bedstead must be raised six inches, by placing blocks of wood under them, so that the womb may be forced upwards, and the points of irritation thereby removed. In a few hours the threatening symptoms will subside; but the patient must not be allowed to rise from bed under two, or three days, as the erect posture is apt to produce a relapse. In the mean time let her be kept upon a restricted diet, and open her bowels with a little castor oil, or a laxative enema. Before she rises to attend to her usual avocations, let a *Russian belt* be carefully applied around the lower part of the abdomen, which will give her comfort, and secure her against future threatenings. Some authors recommend that patients, under such circumstances, should be kept in bed throughout the whole period of gestation; but such practice cannot be too much condemned, as, in most instances, it injures the female's health.—H.

in some cases. If the ovum is too long in passing through the cervix, it may be of advantage to insert the finger into that part and thus assist in the expulsion; but we should not determine to remove it with the *pincers à faux germe* of Levret, the placenta hook of Dewees,* nor any other instrument, unless there should be a pressing necessity to deliver the woman at once, for we run the risk of not getting the whole away, and of being unable subsequently to reach the remaining portions which could not be seized at first.

633. After the escape of the fœtus, every thing returns to its natural state, just as it does after a lying-in. The deliverance of the placenta, the milk fever, and the *sequelæ* of the labour require the same cares, particularly if the pregnancy has exceeded the fourth month, and even in the first months, when the ovum comes away whole; but if the membranes are left behind after the expulsion of the fœtus or embryo, as they compose the chief portion of the product, the consequences do not always terminate at once; in such cases we can never feel secure until after their complete expulsion, and it would be wrong not to extract them as soon as it is possible to seize them in the vagina.†

SECTION 2.

Of the Term of Gestation, and of Retarded Births.

634. The natural duration of gestation in the human species is generally nine months, or rather two hundred and seventy days. "Man only," says Aristotle, "is born at seven, eight, nine or ten months; the last-named period is the most common; sometimes, however, pregnancy lasts until the commencement of the eleventh month." According to Pliny, gestation may continue a whole year. Riolan thought he had seen pregnancies of twelve, thirteen, fourteen, fifteen, and even of eighteen months. Kiperus, according to Millot, and Chanvalon pretend that the duration of pregnancy varies according to climate. Heister thinks we may establish that the term of nine months is the most ordinary one, and that the time fixed by nature is that which elapses from the seventh to the eleventh month. Sennertus thinks that every birth should be deemed regular that happens within one year. Blanchard, Hoffmann, Mauriceau, Schenck, and De la Motte have related cases confirmatory of the opinion of Heister. Levret contents himself with advancing that the woman most commonly carries the child nine months, that many exceed that term, but that few go beyond the tenth month.

* The placental forceps of Hodge.—H.

† See the article on *Delivery of the Placenta*.

635. In a cause that was pleaded by the celebrated lawyer Gerbier, the duration of pregnancy suddenly gave rise to some very animated discussions, about the middle of the last century.

Haller, Bertin, Lieutaud, A. Petit especially, and Lebas, Vicq-d'Azyr, and Roussel, who were partisans of protracted pregnancy, were vigorously opposed by Bouvart, Mahon, Hebenstreit, and Louis. The latter author had no difficulty in demonstrating that the numerous histories of protracted pregnancies mentioned by his antagonists prove nothing in the present case, and that women scarcely ever know the precise period at which they were secundated; but he was wrong to appeal to the immutability of the laws of nature, and the necessity of not interfering with social order. "If," cried he, in his enthusiasm, "you add to the means women already possess of deceiving those about them, the faculty of giving posthumous children to their husbands whenever they choose, what will become of the order of succession, and even of the entire social order?" As if, in the natural sciences, we ought not to seek after truth rather than concern ourselves about social conventions! On the other hand, Petit and Lebas too complaisantly admitted as proved what was not even in every instance probable; so that in spite of the numerous analogies with which they fortified their opinions, the question remained undecided both by naturalists and physicians.

636. At present the state of the case is changed; the antagonists of Petit relied chiefly on the circumstance that, according to Aristotle, "the period of gestation in animals is limited to a fixed space, and the term at which they bring forth is not subject to any variation." But as Buffon had before pointed out, this assertion is wholly false; Millot speaks of a cow which brought forth its calf five days after the term, and of a cat that kittened nine days before the regular period. Besides, M. Tessier, member of the Academy of Sciences, a man whose honour and good faith cannot be called in question, has removed all doubt upon this subject.

He found that, of one hundred and sixty cows, which commonly carry their young nine months, as women do, only three brought forth on the two hundred and seventieth day; that fifty of them went from the two hundred and seventieth to the two hundred and eightieth, sixty-eight from the two hundred and eightieth to the two hundred and ninetieth; twenty to the three hundredth, and that five of them did not calve until the three hundred and eighth day, which is thirty-eight days beyond the term. On the other hand, fourteen of them calved from the two hundred and forty-first to the two hundred and sixty-sixth; so that we find sixty-seven days betwixt the two extremes.

Of one hundred and two mares, whose term is eleven months, three of them foaled on the three hundred and eleventh day; five from the three hundred and tenth to the three hundred and thir-

tieth ; forty-seven from the three hundred and fortieth to the three hundred and fiftieth ; twenty-five from the three hundred and fiftieth to the three hundred and sixtieth ; twenty-one from the three hundred and sixtieth to the three hundred and seventieth ; and one on the three hundred and ninety-fourth day, which gives a latitude of eighty-three days.

637. Thus, far from being fixed, the duration of pregnancy, in brutes, is, on the contrary, extremely variable, and as the habits and constitutions of women render them incomparably more liable to impressions than any of the inferior species of animals, it is evident they must be liable to the same irregularities. Besides, the following proof taken in the human species, and admitting of no reply, is related by M. Désormeaux. A lady, the mother of three children, was seized with insanity in consequence of a severe fever, and all the resources of hygiene and therapeutics had been exhausted upon her case in vain ; a physician thought that a new pregnancy might perhaps restore her intellectual faculties. The husband consented to note down in a register the day of each sexual union, which took place only once every three months, so as not to interfere with any still imperfect conception. Now, this lady who was watched by her servants, and who was, moreover, endowed with very severe principles both of morality and religion, was not confined until the lapse of nine months and a half.

Being agitated anew in a celebrated cause before the House of Lords, at London, in 1825 and 1826, this question was decided in the affirmative ; but the physicians did not agree upon a fixed term which must be always admitted. Out of twenty-five who were examined, seventeen said that pregnancy terminates about the thirty-ninth or fortieth week, or betwixt the two hundred and seventieth and the two hundred and eighteenth day ; but some of them did not consider the case of Elizabeth Adderly, the wife of Lord Hyde Gardner, who was brought to bed on the three hundred and eleventh day, as impossible. Dr. Blundell mentioned one pregnancy of two hundred and eighty-seven days. Dr. Merriman said he had seen several of two hundred and eighty-five, and two hundred and eighty-seven days ; two or three of two hundred and ninety-six, one of three hundred and three, and one of three hundred and nine days. Dr. Dewees relates one where the woman was not delivered until the two hundred and ninety-third day, &c. To these testimonials I may add a case which fell under my own notice. A woman in her fourth pregnancy computed that she was four months gone when she came to my amphitheatre. I distinctly felt both the active and passive motions of the fœtus. Appearances of labour took place at the end of the ninth month, were soon suspended, did not return for

thirty days, languished a whole week, so that in fact the delivery did not take place until the three hundred and tenth day.

638. We may therefore conclude that tardy births are incontestable; but that in the present state of our knowledge it is not possible to affix to them any precise limits. Moreover, since the French code, in order to do away any thing arbitrary in the decision on such cases, has determined that the legitimacy of a birth may be contested when it occurs after the three hundredth day, or the tenth month, this point of physiology has lost much of its importance; for at present what is essential for the physician to know is, whether a child can or cannot remain longer than nine months in the womb.

SECTION 3.

Of Precocious or Early Births.

639. If fruits ripen sooner in certain climates and years than others, if the appearance of flowers, if vegetation generally may be more advanced: if the hatching of the chick varies from the nineteenth to the twenty-first day, or even from the eighteenth to the twenty-second; if some cats who carry their young only nine weeks, may bring them forth nine days before their term; if out of one hundred and sixty-two cows, fourteen of them calve from the two hundred and forty-first to the two hundred and sixty-sixth day; if out of one hundred and two mares, six of them foal from the three hundredth and eleventh to the three hundredth and twenty-sixth day, while their natural term is three hundred and thirty days; if sows, rabbits, &c., exhibit the same variety, wherefore may not the duration of human pregnancy be also advanced or abridged in the like manner? I do not see that any thing reasonable can be objected against the possibility of precocious or early births.

640. Every body knows that one fœtus is sometimes better grown and stronger at six months than another at seven or more; that a child at term is sometimes not so stout nor tall as another which is only of seven or eight months gestation; that on this point the development of the ovum exhibits varieties that are almost infinite; that the changes that take place in the organization of the womb, from the period of fecundation onwards, tend to develop it in a force similar to that which directs the action of the muscles; that, except in case of accidents, parturition is not effected until this force attains such a degree as that the uterus may contract with the utmost force of which it is susceptible; which necessarily takes place sooner or later, according to an infinitude of circumstances; all these things are known, I say, and shall any one dare to maintain that precocious births are impossible!

CHAPTER V.

OF LABOUR.

WHEN gestation has passed through all the stages, when the ovum has attained its last degree of maturity, and the organism of the fœtus is sufficiently perfect to enable it to live independently of the mother, the birth of man takes place, and this is the phenomenon, the fifth of the great function of reproduction, which is called *labour*.

It has been recommended at different times to replace the word *accouchement* derived from *ad* and *cubare*, placed near to, by that of parturition, derived from *partus*, *partio*, *parturire*, or by that of child-birth, *puerperium*; but as custom cannot give place to a false or erroneous acceptance, these different substitutes have not been adopted.*

Definitions. Levret has defined labour as a natural operation, truly mechanical, and susceptible of geometrical demonstration; which is neither figuratively nor really true. Astruc, imbued with the same notions, thought he could reduce the art of delivery to the solution of the following problem: "An extensible cavity of a certain capacity being given, to extract therefrom a flexible body of a given length and size, through an opening which is dilatable to a certain extent." As if it were a matter of indifference whether the fœtus should be extracted artificially or whether its expulsion should be left to the powers of nature! Baudelocque also has said that labour is a purely mechanical operation, subjected to the laws of gravity and motion; as if it were possible to make precise calculations of organic actions, by reasoning upon the laws that govern the physical world! In asserting "that labour is nothing more than the passing of the child and its appendages from the womb," M. Maygrier also employs a faulty definition, inasmuch as it does not express the action which occasions this passage. Neither is it correct to say with Madame Boivin, that labour is the emission, expulsion, or excretion of a living child at full term, together with its appendages, occasioned by the contraction of the uterus, and the disposition of the genital organs of the mother. This definition, in the first place, is inconvenient, in being too long; and then it comprises only natural labours, and does not embrace either precocious or retarded birth, nor cases in

* In France.

which the child is dead *in utero*. According to M. Désormeaux, who has properly felt the insufficiency of the principles of Levret, Astruc and Baudelocque, "labour is a function which consists in the expulsion of a fœtus from the womb, in which it grew during the whole time of gestation." By substituting for the words operation and escape those of *function* and *expulsion*, this able practitioner has rendered his definition incomparably better than any that existed before. However, were it of any great consequence in practice to adopt one definition rather than another, I should prefer simply to say, *that labour is a function that consists in the expulsion of the ovum from the mother's organs*.

641. By making use of the word *operation*, physicians have gradually become accustomed to see in labour a phenomenon almost wholly foreign to the economy; and thence their eagerness to terminate an action which did not require their assistance; by admitting, on the contrary, that labour is a function, we feel ourselves naturally prompted to let nature act, whom we assist, but whose place we carefully abstain from taking, except in cases where we have before-hand ascertained with mathematical precision that the resources of nature are incompetent.

642. *Classification*. Many plans have been proposed for the classification of labours; Mauriceau, adopting the sentiment of Hippocrates, calls those natural labours in which the child's head presents, and which terminates without assistance; all others he calls preternatural. Peu makes use of the word *laborious* instead of *preternatural*. De la Motte describes them as natural, non-natural, preternatural and untoward. Soon afterwards were admitted, under the title of *natural* labours, all those in which the head or the breech presented; under that of *laborious*, those which, notwithstanding the favourable position of the fœtus, are so long protracted that we are obliged to assist them; all those were called *preternatural* in which neither the head nor the breech presented to the strait. Smellie modified this classification, and said, "I call that a natural labour in which the head presents, and the woman is delivered by her pains and the assistance commonly given: but should the case be so tedious and lingering that we are obliged to use extraordinary force in stretching the parts, extracting with the forceps, or (to save the mother's life) in opening the head and delivering with the crotchet, I distinguish it by the appellation of *laborious*: and in the preternatural, comprehend all those cases in which the child is brought by the feet or the body delivered before the head." Smellie's division, taught at the same time by Astruc, adopted by Solayrès, and propagated by Baudelocque, is still followed by a majority of French accoucheurs.

643. There are few authors, however, who have not attempted to show its incorrectness, and readily succeeded in doing so; but as those which have been proposed as substitutes are not less incon-

venient, it has preserved at least the advantage of being more generally known than any other.

It would be quite as well to follow it, for example, as with Mil-lot, to admit of a division into natural labours, properly so called (the child presenting the head); irregular natural labours (the child coming breech foremost); artificial labours (those which require the employment of the hand, either alone, or armed with some instrument, but without any necessity for dividing the mother's parts); preternatural labours (where it is necessary to make an artificial passage for the child); or, with M. Gardien, to admit of mixed labours (where the position of the fœtus only requires to be changed); or with MM. Maygrier and Gardien, and Madame Boivin, to make a division of artificial labours (preternatural and laborious labours); with M. Capuron, mechanical labours (where recourse is had to instruments); or manual labours (the preternatural of Baudelocque); or to make along with Denman a fourth class, under the title of anomalous labours; or with Burns, to establish seven classes to confuse every thing: 1. Natural labour; 2. Premature labour; 3. Preternatural labour; 4. Tedious labour; 5. Instrumental labour; 6. Impracticable labour; 7. Complicated labour. In fact these accoucheurs have only changed the acceptation of the terms they employ, or the new ones they propose are still more faulty than the old ones, and I cannot perceive that the modifications adopted by MM. Herman of Berne, and Dewees of Philadelphia, obviate this inconvenience. Besides, there is no such thing as a labour purely artificial, and the student cannot at a first glance understand the difference between a manual and mechanical labour, any better than that between preternatural and laborious labours.

The division that I prefer approaches very nearly to the one indicated by Mauriceau. All labours that terminate under the sole influence of the powers of the organism, after the manner of M. Lebreton, I call *spontaneous*, fortunate or simple; those, on the contrary, that present difficulties of what nature soever, and which in any way endanger the life or the health of the mother or of the child, I call *difficult*, troublesome or complicated; and each of these great classes may in turn be divided into orders, genera, species and varieties, if the wants of the science call for it.

TABLE I.			
DIVISION OF LABOURS.			
BAUDELLOCQUE. 5 Classes.	1. Natural Labours. Re- quiring no assistance.	{ <ol style="list-style-type: none"> 1. Positions of the vertex. 2. Positions of the feet. 3. Positions of the knees. 4. Positions of the breech. 	
	2. Preternatural labours. Requiring the use of the hand.		{ <ol style="list-style-type: none"> 1. Faulty positions. 2. Accidents during labour.
	3. Laborious labours. Requiring the use of in- struments.		{ <ol style="list-style-type: none"> 1. Faults of the female organs. 2. Monstrosity of the fœtus. 3. Want of power of the organs.
MM. DUBOIS and DESORMEAUX. Mesd. BOIVIN and LACHAPELLE.		Like those of BAUDELLOCQUE. Presentations of the face are classed among the natural labours.	
The AUTHOR. 2 Classes.	1. Eutocia.	{ <ol style="list-style-type: none"> 1. The vertex. 2. The face. 3. The pelvis. 	All labours that terminate spontaneously.
	2. Dystocia.	{ <ol style="list-style-type: none"> 1. Hemorrhagic. 2. Convulsive. 3. Aneurismal. 4. Hernial. 5. With procidentia. 6. From disease of the woman. 7. From narrowness of the pelvis. 8. From wrong positions. 9. From exhaustion, &c. 	

ARTICLE I.

OF LABOUR IN GENERAL.

644. Labour is said to be *at term* or *timely* if it takes place at the ninth month of pregnancy; *tardy* or *retarded*, if the pregnancy extends beyond this period; *advanced*, *hastened*, *precocious* or *premature*, if it takes place between the seventh and the ninth months; and it is called *miscarriage* or *abortion* if it occur previously to the seventh month. As it is in some sort produced by the same causes, and accompanied with the same phenomena in all cases, I shall first examine it in a general manner before entering into the details upon each class in particular.

SECTION 1.

Of the Causes of Labour.

645. It is common to divide the causes of labour into proximate and remote, or also into occasional or determining, and efficient or immediate.

§ I. EFFICIENT CAUSES.

646. The efficient causes are those which *effect*, or properly speaking, *constitute* (*font*) labour; they have greatly occupied the attention of physiologists and accoucheurs in all ages; they have by turns been attributed to the fœtus, the womb, the abdominal muscles, the diaphragm, and sometimes to all these parts together. Hippocrates and most of the ancients thought that at the end of gestation the fœtus tears the membranes, extends itself like a spring, and pushes with its feet and breech against the fundus of the uterus, while with its head it presses upon the cervix so as to dilate it, pass through it, and then escape from the genital organs. This opinion, which still prevails amongst the vulgar, was founded upon what takes place in birds, where the little chick, for example, breaks the surrounding shell with its beak, when it reaches the period of hatching; upon the circumstance that children that die while in the womb are born with more difficulty than those who are strong and vigorous; and lastly, on the fact that children have been frequently known to escape spontaneously from the womb after the death of the mother.

647. Nevertheless, it has never been generally admitted that the fœtus is the sole agent, the sole efficient cause of delivery; indeed, the wisest authors believed that it played an important part in this grand function; but that it could not come forth without calling other powers to its aid. In this respect the opinion of the moderns is entirely opposed to that of the ancients. During the process of its birth the fœtus does not exert in any way an active power; the analogy which it was attempted to trace between child-birth and the hatching of a chick cannot withstand the very weakest objection: in most cases the death of the child does not affect its expulsion at all; besides the slowness of the labour in such a case is explained by the fact that the fœtus when dead is flaccid, and cannot present to the womb the same firm resistance as if it were alive; that if putrefaction have commenced, the irritability and contractility of the womb often receive a mischievous influence therefrom, and to a greater or less extent lose their natural vivacity; finally, that the vitality of the fœtus being generally proportioned to that of the organ in which it is contained, it is quite natural that the labour should be more prompt

and easy where the child is robust and healthy than where it is feeble or diseased.

648. Those labours that sometimes take place after the death of the woman, and form the principal argument of the partisans of the ancient hypothesis, furnish on the contrary a decisive proof in support of the opposite doctrine. In these cases the children have always been found lifeless between the mother's legs; it might even be affirmed that they died first. They escape from the womb by means of a power wholly extrinsic to them; after death, the organs of the *life of relation*, especially the muscles, become relaxed, while those of vegetative life continue for some time in possession of their contractility; sometimes the abdomen becomes filled with gas with surprising rapidity; so that if the labour is far advanced when the woman dies, it is not a surprising matter that the uterus, being mechanically compressed from without, meeting with no further resistance from the perineum, and still retaining the power of contraction, is enabled completely to expel the ovum without any necessary participation on the part of the fœtus. This was evidently the nature of the case with the woman named Homer, who gave birth to a dead child, thirty-four hours after she had herself ceased to exist.

649. In the second place, observation has demonstrated that delivery takes place pretty nearly in the same manner whatever be the period at which it happens: now, where abortion takes place in the first half of the period of utero-gestation, it is evidently impossible for the fœtus to make the least effort to escape from the organs. How can so delicate a creature be supposed capable of dilating an opening, through which the most vigorous man might vainly essay to pass his hand? Who does not know that until the fourth or fifth month it is scarcely capable of making a few motions; that it is rarely strong enough to be born alive, or at least to live over a few minutes after birth? Were it to act of itself in labour, it would commence by rupturing the membranes: however, the bag of waters is not broken until the last stage of labour; in some cases it does not break at all, and the ovum comes away whole; besides, the very moment when the bag of membranes presses upon the cervix in order to engage in it, is the time when the fœtus retires from it, instead of pressing upon it. If it be true that the birth of a dead or very feeble child is generally effected more slowly than that of a fœtus that is strong and full of vigour, it is also true, that the difference between the birth of a living and dead one is not sensible. In all cases, the after-birth comes away at last, and we are compelled to agree that the action of the fœtus has nothing to do with that. Let the head, the trunk, or any separate part be left in the womb, and it will be expelled, just as if the fœtus were whole, and living. The placenta, the membranes, the clots, the whole after-birth, a mole, a

fibrinous concretion, a polypus, and all kinds of bodies, in short, that are met with in the womb, are incapable of any spontaneous action, and yet their expulsion is effected by the same laws and announced by the same phenomena as those of the most robust and the healthiest fœtus. It is therefore undeniable that the fœtus is not the efficient cause of labour; that instead of performing a part essentially active in this process, it is on the contrary completely passive from the beginning to the end of it.

650. This cause should be sought for in the organs of the mother, which was not done until in the last century. Galen, J. Fabricius, Gelée, Harvey, Levret, &c., had, it is true, already maintained that delivery is effected under the influence of the contractions of the uterus, the abdominal muscles, and diaphragm; but this opinion, being vaguely expressed, did not have any effect on the theory of parturition. Besides, Haller thought that the womb is but a secondary agent, and that the abdominal muscles and diaphragm are the chief agents. To A. Petit was reserved the glory of demonstrating beyond dispute, that the efficient cause of labour is essentially constituted by the contractions of the uterus, and partly by those of the muscles of the abdomen and thorax.

651. *Essential efficient cause.* We acquire by direct observation the proof that the contractions of the uterus constitute the efficient principle of labour. By applying the hand upon the epigastrium during a pain, the womb is felt to grow hard, to shrink, to lessen in size, in one word, to contract; the finger, when introduced into the vagina, perceives the orifice to become stretched, to grow thin, and dilate or contract according to the stage of the labour. As soon as the pain ceases, nothing of this sort can be perceived; all the parts become relaxed; as soon as it returns, all the phenomena of contraction reappear; but it is particularly when we are compelled in performing some operation, to introduce the hand into the interior of the womb, that we abandon all doubt as to the important part which it performs in the expulsion of the ovum. It pretty often happens here that the operator is obliged not only to suspend his progress during each contraction, but he also sometimes loses for a short space all sensibility, all power to act, and the hand, which is benumbed, and as it were paralyzed, becomes incapable of distinguishing the objects it touches. What practitioner has not had occasion to see that it is not possible, during a pain, to pass through the os uteri? Who does not know, that when passed up to search for coagula, the placenta, or the fœtus itself, the hand is soon forcibly expelled, together with the foreign body it was designed to remove?

652. Strictly speaking, the contractions of the uterus might suffice for the expulsion of the child; in several cases of complete procidentia of the womb, such as those reported by Peu, Jalouzet and Madame Lachapelle, the pregnancy has been found to go to

the full term, and the labour to terminate spontaneously; many women have been unconsciously delivered during an attack of lethargy, of asphyxia, or in a deep sleep, into which they had fallen in consequence of criminal attempts. Women weakened by protracted disease, a hemorrhage, or exhausted by suffering unconnected with childbirth; those who are affected with ascites, inflammation in the chest, delirium, or madness; those whose abdominal muscles, thin, and pale, have lost almost all their contractility; such as are pusillanimous, timid, excessively irritable, or of a very marked lymphatic constitution; and lastly, all such as from debility, disease, want of courage, excess of sensibility, or want of power, do not *bear down* at all, and who, on the contrary, employ all the resources of their volition to arrest the least effort of their muscular system, are delivered notwithstanding. The womb alone in such cases bears the whole burthen of parturition.

653. *Accessory efficient cause.* Nevertheless, the womb in most cases requires to be sustained by the action of the diaphragm and abdominal muscles. The concurrence of this action is so evident in most women that no observer has thought of denying its existence, and that it is sufficient to announce it as a simple proposition; but its importance has not been understood in the same way by all authors. According to Haller, the womb contracts only for the purpose of preventing the child from being pressed together into a confused mass, to force it to present one extremity of its occipito-coccygeal diameter to the straits; by their contractions, the abdominal muscles support the womb in front and on its sides, so as to prevent it from deviating, or from abandoning the direction of the axis of the pelvis, or bending in any direction, and make it in some respects resemble a straight canal, continuous with the pelvis. The descent of the diaphragm then bears wholly upon the fundus of the uterus; the cervix, being unsupported, yields to the effort; and the fœtus, being forced from above downwards, passes through the genital organs as an inert and solid trunk, passing out of a long canal with inflexible parietes.

654. By carefully noticing the proceedings of nature, it will be perceived that the idea of Haller expresses very well the mode in which the diaphragm and abdominal muscles operate; but it is incorrect, inasmuch as it attributes to the uterus only a secondary part, whereas it is a matter of demonstration that its contractions constitute the chief cause of delivery. Upon this hypothesis, the expulsion of the ovum is almost wholly submitted to the volition of the woman, but no one is ignorant of the fact that parturition is almost entirely involuntary. Further, it was not so much Haller himself, as his commentators, who desired to limit in this way the importance of the uterine contractions; for that great man says positively, that the efforts of the woman are not always indispensable to the termination of the labour.

655. On the contrary, far from acting with so much power on the womb, the diaphragm, as has been remarked by M. Bourdon, only serves as a firm *point d'appui* for the abdominal muscles. Whenever an effort is made, the chest dilates, the lungs fill with air, after which the glottis closes; the diaphragm gives to the base of the thorax, which is, moreover, supported within by the distended lungs, a degree of immovableness and solidity, which affords to the muscular powers a fixed point that they could not otherwise have obtained; whence it follows, that it is not by pressing the viscera from above downwards, as is generally supposed, that the diaphragm assists the uterus, but rather by giving to the chest the power of resisting the contractions of the abdominal muscles, which contractions are thus rendered effective upon the body to be expelled.

656. In most women the uterus is the first and only part to contract until the fœtus has reached the excavation of the pelvis. From this moment a sense of weight, of straining, or of tenesmus, irresistibly invites the concurrence of the contractions of the abdominal muscles. Whilst the sole object of the womb is to dilate its neck, it needs no aid; but when the orifice is sufficiently large, the fœtus must next be forced through a firm and very narrow canal, greater powers become indispensable, and the uterus, redoubling its efforts, rarely fails to solicit the action of all the muscles of the body. The head and limbs being first fixed, the chest dilated, the diaphragm depressed, the lungs filled with air, and the glottis closed, permits the abdominal parietes, firmly attached to the pelvis and base of the thorax, to contract from before backwards, as well as laterally; the viscera, being unable to raise the phrenic septum which separates them from the lungs, transmit directly to the fundus of the womb the lively impression they have received; the latter organ, also sustained on all sides, now efficaciously employs all its powers to expel the fœtus through the cervix, the only point which now offers no resistance, and upon which all its efforts comes to operate.*

657. This is the way in which the process takes place in a natural state, but the organism is sometimes obliged to take another course; the woman is not always capable of effecting this combination of actions. In certain cases the uterus, compelled to suffice for itself, sometimes succeeds in producing the desirable result without any difficulty; but in other cases, being too feeble, either in consequence of over-distension, which destroys its tone

* Hence it is that women, who are urged by the bystanders to bear down during the grinding pains, find themselves unable to do so. The contraction of the accessory or abdominal muscles, can be of no assistance until the child, and the womb itself, have sunk so far down into the excavation, that those muscles become able to act upon the fundus uteri, so as to fix it firmly while the contraction of the uterus propels the head against the resisting points.—M.

by reducing the thickness of its walls, or of contractions too long continued or too frequently repeated, or because its function is interfered with by some modification of the natural state of its structure, it yields in importance to the muscles, which, if directed with a vigorous and courageous will, are sometimes able to expel the fœtus with but a feeble co-operation on the part of the womb.

658. In this sense only may labour be regarded as in some cases a partly voluntary function, like the excretion of stool, and the emission of urine. Doubtless, a woman who *bears down*, as it is called, who enforces her pains, no matter how feeble soever they may be, will get rid of the product of conception sooner; and that another may, to a certain extent, protract its expulsion by preventing as much as possible the contraction of her muscles.

659. A woman presented herself at Baudelocque's amphitheatre, to be delivered there; the labour at first went on very regularly; the pupils were assembled; the dilatation of the orifice was suspended, and a whole night passed away without it making any progress; the spectators, who were fatigued, now dispersed; the pains soon returned, and the dilatation went on; the young people being notified, re-assembled; again the phenomena of the labour ceased. Baudelocque, suspecting the cause of these irregularities, gave a hint to the pupils, who all left the apartment with an injunction not to go far, and to return upon the first signal; the woman immediately began to bear down, and the child's head soon reached the vulva; the pupils were then called, and the labour which it was no longer in her power to suspend, soon terminated. I witnessed a nearly similar case in 1825. One of the first women that came to lie in at my amphitheatre, had pretty smart pains, and the neck of the uterus dilated regularly and promptly as long as there were only a few pupils present. When they had all assembled, she continued to complain in the same manner, but the labour did not advance at all; the whole day and night passed in this manner; in the morning all the witnesses went away to get some sleep; the dilatation began again; about noon it was quite advanced; the pupils returned, and the phenomena were immediately suspended; at nine o'clock in the evening she was left alone, and as I was going out, I said it would be well to assemble again between eleven and twelve o'clock at night. A few minutes afterwards, the pains were accompanied with a sensible dilatation, and the efforts directed with so much force, that the child passed the inferior strait at ten minutes before eleven, just as two of the students entered the room. Before she left the ward this woman confessed that her object was to get rid of the students, and to disembarass herself as soon as they were gone. But these are exceptions which do not hinder us from establishing it as a general rule, that the will has scarcely any in-

fluence on the progress of labour, except that exerted by means of the abdominal muscles and diaphragm.

§ II. DETERMINING OR OCCASIONAL CAUSES.

660. When it is remembered how much time was required to acquire correct notions concerning the efficient causes, no surprise ought to be felt at the vagueness of opinions at the present day in regard to the determining causes of labour. The ideas first entertained varied in accordance with the predominant medical hypotheses of each particular period; and then according to the notions entertained by accoucheurs upon the efficient causes: sometimes they were referred to the *fœtus*, and sometimes to the womb or other parts of the mother. They may be divided into natural determining causes, and accidental determining causes. The former necessarily have their origin in the ovum, or in the economy of the woman; they exist, therefore, in every case, and belong to labour properly so called. The latter are derived from without, are foreign to the organism, depend upon a disease of the ovum or womb, or upon some particular predisposition, &c.; they are, strictly speaking, the causes of abortion: I shall, therefore, not treat further of them in this place.

661. Believing that the *fœtus* itself opened a passage for its escape, certain authors imagined that the waters of the amnios become so acrid and irritating, as at last to produce a painful excitation of the skin; that the bladder and rectum, fatigued by the presence of the urine and meconium, caused the child to feel a necessity of passing off those matters; that the too elevated temperature of the uterus forced it to come forth and seek in the air the means of refreshment; and it could not live without respiration; that it was affected by the obliteration of the utero-placental canals, and of a part of the vascular system of the placenta itself; that it no longer received sufficient materials for its growth; that its weight and maturity led it to detach itself, as a ripe fruit falls from the limb of a tree; and that the circulation could not be longer performed without the actions of the lungs. At a first glance, it might seem superfluous to repeat all these various opinions, since it is actually demonstrated that the child is not the active agent of its own escape; but as it has been on the other hand pretended that it only puts the uterine contractions into play, under the influence of the same causes of uneasiness, embarrassment or necessity, I thought it best not to pass them over in silence.

662. In the first place, all this scaffolding is supported on mere suppositions. As has been said by A. Petit, no fluid in the animal economy is less acrid than the liquor of the amnios; if it ever does acquire any irritating properties, it happens as often at six, seven,

or eight months as at nine, and it has never been shown that the pregnancy in such cases was advanced one single day.

663. The child is so little disturbed by the necessity of voiding its meconium or urine, that it sometimes remains several days after birth without discharging them; who told it that outside of its place of habitation there was air for it to breathe, and to cool the heat of its blood? The temperature of the uterine cavity is the same as that of the rest of a woman's body, and a thermometer placed there during labour, would not rise any higher than one held in her mouth; moreover, the experiments of M. Edwards prove that, far from being burning hot, the temperature of the fœtus is two degrees lower than that of the mother, as long as it remains in the womb; it is not true that the anatomical disposition of the utero-fœtal vascular system is at child-birth sensibly different from what it was a few weeks previously; nor is it more true that the ovum is permeable by fluids, or less adherent at the end than about the middle, or even at the commencement of gestation; it is an ingenious metaphor to say that it separates like ripe fruit, but nothing like explanation has been thereby gained.

664. But if it be true, that the sudden, violent and convulsive-like movements of the child sometimes force the labour to come on before the natural term, it is not less true that that is an accident which ought to be classed among the causes of abortion, and that labour most frequently comes on without any thing of that kind being noticed. Neither can the contractions of the ductus arteriosus, the ductus venosus, and foramen ovale, as they do not take place to the same extent in every fœtus, be the cause of a phenomenon whose period very rarely varies, and with which variations it has besides no correspondence.

665. An anonymous author, who was for a long time opposed by Millot, speaks of a vacuum that takes place in the *sac of generation*, in consequence of the transudation of its waters, and pretends that the uterus, obeying its natural elasticity, closes up so as to remove this void; but it is easy to perceive that this author mistakes the effect for the cause, and has misunderstood the question.

666. Steinzell and others have referred the occasional cause of parturition to the periodical *nisus* of each menstrual period. But in the first place many pregnant women are met with, in whom the habit of menstruation has never been exhibited. Now the influence of habit is felt so much the more powerfully the nearer we are to the instant when it was left off. Yet, in the hypothesis of Stein, precisely the contrary is remarked. Besides, in order to see at once the futility of such a theory, it is merely necessary to advert to the fact, that the ninth catamenial revolution takes place in some females at the commencement of the eighth month, in others at the seventh, often at the end of the tenth, and that a good many

women do not menstruate more than two or three times a year, while the differences observed in the duration of pregnancies are so few, that many persons still doubt as to their existence.

667. MM. Lobstein and Chaussier seem to admit that this cause, which has been so much sought for, is found in the completion of the organization of the womb, which waits until the muscular character of its fibres is fully developed before it contracts. But miscarriages and premature labours fully demonstrate the insufficiency of such an explanation.

668. According to Loder the extensibility of the womb is confined within certain limits; the fibres of the womb fatigued by a long-continued state of distension, being unable to yield any further, react, at the end of the ninth month, upon the body that had kept them so long extended, and thus decide the act of parturition; but upon reflecting that the development of the womb is not a passive phenomenon, that twin pregnancies, or those where the ovum from some cause attains to very great dimensions, do not terminate any sooner than those where the womb acquires but a very small size, we are compelled to reject this hypothesis also.

669. The opinion of Levret and Baudelocque, entertained also by M. Désormeaux, has at the present day the greatest number of partisans. Founded on the arrangement of the uterine fibres, and upon observation of the phenomena of pregnancy, it has appeared to be more satisfactory than any other. It is said—if the cavity of the body of the womb, only, enlarges during the four or five first months, and that of the cervix afterwards dilates by degrees, from above downwards, and confounds itself with the former, it depends upon the circumstance that the fibres of the body and fundus, placed lengthwise, and being the softest and most extensible, distend and yield more easily than those of the neck, which are circular, denser, more compact and situated transversely. Between them is established a kind of balancing or contest, which results in the induction of labour: those of the body must be looked upon as so many loops which embrace the ovum in their concavity, while their extremities are attached to different points of the circles of the neck; the former at first yield without difficulty, and even without re-acting upon the latter; but about the middle of pregnancy, by elongating, they stretch the fibres of the neck, whose circles disappear or are thus drawn in succession into the body of the organ; so that at last the canal of the neck no longer exists, but merely an orifice with a circumference of greater or less thickness. There is then an equilibrium between the neck and body of the womb; but as the looped fibres have now no other resistance to overcome than the circular fibres, they triumph over the *os uteri* with great facility, the equilibrium is soon broken, and labour commences.

670. According to this view of the circumstances, I should define the determining cause of labour to be, the *tendency* of the

fibres of the body of the uterus to contract ; a tendency or effort which produces no real and sensible effect, until from the moment when the cervix ceases to furnish any further materials to the enlargement of the womb.

671. A. Petit expressed himself upon this subject somewhat differently : "It cannot be doubted," says that author, "that the determining cause of the uterine contractions is the irritation experienced by the uterus when pregnancy has reached its full term. I consider the cervix as a *magazine* in which nature has placed in reserve the quantity of muscular fibres which she needs, to furnish by their development materials for the expansion of the womb during the course of gestation. In the natural state this expansion, when once begun, proceeds *pari passu* with the growth of the fœtus ; every thing is proportioned, fixed, so that when the latter is sufficiently developed to bear the action of external agents, and employ them for its own benefit, all the fibres of the cervix have yielded, and the magazine is exhausted ; labour will therefore take place when all the fibres that had been placed in reserve in different parts of the womb, and chiefly in the substance of the cervix, shall have been employed. As long as any of them remain, the womb may go on increasing, and no irritation will be occasioned ; a simple development is not capable of producing it."

672. This explanation is more rational than the version given of it by Baudelocque. The idea of a struggle between the fibres of the different points of the uterus is doubtless ingenious, but the fact which it expresses has no existence in nature. To me it seems evident, that by imbibing fluids during the pregnancy, the organ of gestation is enabled to unfold its fibres in an active manner ; that this unfolding takes place first in the body and fundus, because there the ovum is lodged in the commencement ; that it afterwards takes place in the neck by the same mechanism, that is, by the accumulation of liquid molecules, which gradually separate the constituent molecules of the fibres ; that this unfolding being brought to a conclusion, and the womb besides having acquired the compliment of its muscular organization, enters upon its contractile state for the purpose of expelling the body that fills its cavity, and that now begins to produce in it a more lively state of irritation.

673. Miscarriages, and premature labours, as well as protracted gestation, &c., might be rigorously accommodated to this mode of interpretation ; but another one is required for extra-uterine pregnancy. Where the ovum is developed in the tube, or in the abdomen, or substance of the womb, what in fact becomes of this balance betwixt the action of the fibres of the neck and body, this magazine held in reserve, this unfolding of the fibres, which at a first view gives so satisfactory a solution of all the other cases ?

Let us then frankly confess that the deeper we search into the question of the determining causes of labour, the greater will be the number of objections against the explanations that have been given; but do we any better know the determining causes of the contraction of the heart, and of an infinity of other actions which like it must be admitted as facts?

SECTION 2.

Of Labour.

674. The name labour or travail is given to the collection of phenomena which constitute child-birth; or, if we choose, child-birth gives rise to a series of phenomena, local or general, which are embraced under the one title of labour.

675. As the phenomena of labour are numerous, and appear in succession, it has been frequently attempted to group them, to form different bundles of them, so as to class them better in the memory; but as these divisions have never been established otherwise than upon arbitrary or purely conventional data, it has happened that they do not resemble each other in any two books. A. Petit, for example, admits three, without saying any thing of the limits to be allowed to each of them. Stein describes four, and that, too, not less vaguely than the former. Millot also thinks that labour ought to be divided into four stages: the first, which he calls the *secret stage*, because the women are scarcely conscious of it, comprises the different symptoms that manifest themselves in the four, five or six days immediately antecedent to the term of gestation: the second extends from the first appearance of the pains to the discharge of the waters; the third begins after the rupture of the membranes, and the fourth when the child is on the point of being delivered.

676. Millot's *secret stage* is classed among the precursory signs by Madame Boivin, who, like Chaussier and Adelon, admits five stages; four for the labour itself, and the fifth for the delivery of the after-birth, but without indicating any very well marked line of distinction between them. M. Maygrier also reckons four stages, as Stein does, and does not circumscribe them either. Denman seems to have been the first to lay the foundation of a good division of labour; according to him the first stage commences with the first pains, and ends with the complete dilatation of the neck, or with the rupture of the membranes; the second extends to the complete expulsion of the fœtus; and the third comprises the delivery of the after-birth. In this way each stage forming a period rigorously determined, it becomes no longer possible to extend or limit as we please the acceptation of the terms made use

of. We might, also, after the example of Burns, describe only two stages, properly so called, and make the delivery of the secundines a separate labour, which appears to me to be rational. M. Désormeaux, who was fully sensible of the advantages of Denman's method, has done better by carrying the first stage to the complete dilatation of the os uteri, without regard to the rupture of the membranes. I shall adopt this course myself, and divide labour only into two principal stages: one which terminates when the dilatation is finished, and another which begins at that moment, and ends with the delivery of the child.

Nevertheless, I shall add, as an independent period, what Millot calls the secret stage, or what Madame Boivin describes under the title of *precursory signs*.

§ I. PRECURSORY SIGNS, OR PRELIMINARY SYMPTOMS OF LABOUR.

677. Labour sometimes comes on suddenly, and without any preliminary symptom; however the organism, which rarely proceeds to the exercise of its smallest functions without some prelude, is most commonly true to its accustomed march, whenever the question is upon terminating the great act of reproduction.

From two to fifteen, and even twenty days before the period, nature in some subjects seems to try her forces; the belly diminishes in size sensibly: the fundus, and even the whole mass of the womb, subside; the motions of the child are felt more than in common; the infiltration and the varicose condition of the lower extremities increase or now become manifest, if not previously present; the labia pudendi in particular become swelled, softened, and occasionally painful; the digestion is better performed; the nausea, vomiting, and curious appetite are done away with, if they had not long before ceased to exist; the respiration is not so short, nor so impeded; the women regain their habitual gaiety and lively humour, are not so sleepy, more disposed to exertion, more active, and often induced to believe, at least in first pregnancies, that their term is further off than they had before supposed. They have a sense of weight in the pelvis, or, as they say, at the *fundament*, with more frequent disposition to stool, and to void their urine. It is then, particularly, that all the articulations, all the ligaments of the pelvic cavity become softened and relaxed; which renders walking, and even standing itself more difficult, more fatiguing, and sometimes even absolutely painful, although the woman is more disposed for them. The secretion of mucus in the genital passages becomes more active, and glairy matter in more or less abundance escapes in flocks from the vagina and vulva; it is not very rare to find the womb in an altogether peculiar state of fibrillar contraction, which may be regarded as a passage from its state of rest to that of its real contraction: that is to

say, by touching the os uteri, we feel that it is from time to time in a state of slight tension or constriction, and by feeling of the body of the organ above the pubis, a movement is found to take place in it; so true is it, that the point of departure of labour cannot always be precisely determined.

678. These different phenomena, which necessarily vary in number, progress and degree in different women, are in general of good augury, provided they are not converted into symptoms of disease. They announce that nature is collecting her forces, uniting her resources, and making all suitable dispositions to accomplish the function she has been so long preparing for. As to their explanation, it is perfectly natural; they all refer directly or indirectly to the change of position of the womb. By plunging down into the excavation, this organ necessarily presses with more or less force upon the rectum, the bladder, the nervous plexuses and the blood-vessels; thence come the tenesmus, the bearing down, the lymphatic or sanguine engorgement of the lower limbs and vulva, the relaxation of the symphyses, the formation of mucus, &c. By sinking lower down, and removing to a distance from the epigastrium, the womb leaves the stomach and liver more unconstrained; the diaphragm, being less elevated, permits the lungs to dilate more, whence more freedom in respiration, circulation, the digestive functions, and consequently in the exercise of the intellectual and locomotive faculties.

§ II. FIRST STAGE, OR PERIOD OF DILATATION.

679. After these preliminaries, labour at length begins; its origin is marked by pains, and short and slight colicky sensations, recurring at considerable intervals. The external parts of generation become moist, and the secretion of glairy mucus, provided it had not appeared before, is added to the number of precursory symptoms. When the colic pains are present, the womb hardens, becomes rounder, and its summit sinks into the excavation; it diminishes in all its diameters; in one word, it contracts: the lips of the os tinæ are effaced, and in an evident manner grow thinner; the orifice stretches, and from the same cause loses its thickness, assumes more decidedly the form of a circle, and manifestly contracts; by introducing the finger into it, the membranes of the ovum will be found endeavouring to engage in it; they are compressed by it, and forced lower down; they grow harder, become tense, very elastic, and difficult to indent. The woman is now frequently tormented with sinister forebodings; she becomes low-spirited, and despairs of safety, says she is going to die, loses all her courage, and is overwhelmed with gloomy thoughts, and a sadness which nothing seems able to dispel; she weeps, is agitated, or remains motionless, and in some instances feels horripilations all over the body. Animals themselves, a very

remarkable circumstance, also fall into this state of lowness at the commencement of labour; they refuse to eat or drink, seem to be tormented with fear; and to be occupied only with the dangers that threaten them.

680. The pains, which gradually increase in strength and severity, at the same time become longer and more frequent; reddish or bloody striæ are soon found to be mixed with the mucous discharges, which are also found to be increased in quantity; the mouth of the womb begins to open, and dilates by degrees; the lower segment of the ovum passes through it, and under the title of bag of waters, projects into the upper part of the vagina; as the pains grow more severe, the general irritation becomes more considerable; the interval between the contractions is not calm; the woman is touchy, cross, impatient, difficult to control; she cannot keep in one place, is discontented with every body, and has an extreme susceptibility; every pain in some degree resembles a paroxysm of fever; it is preceded with a rigor, and sometimes even with a tremor and rattling of the teeth together; the quickness, frequency and hardness of the pulse and temperature of the body augment; the skin is higher coloured and becomes moist; the mouth and tongue dry; the teeth and lips are encrusted, become fuliginous, as in an adynamic fever; a great thirst comes on; she has nausea, vomiting and cough; she wanders, and the intellectual derangement is often carried to such an extent as to resemble delirium. In irritable women, the anguish and restlessness are sometimes carried to the highest degree; and the hardest heart could scarcely resist a feeling of compassion and pity at the sight of these unhappy beings, who, with disheveled hair, blackened mouths, flushed countenance, burning skin and haggard eyes, can only become mothers at the cost of so many sufferings and dangers. When a contraction is over, every thing returns to its natural state; the restlessness ceases; the pulse recovers its ordinary type; the mouth becomes moist; the skin regains its natural colour and habitual temperature; if an examination be now made, the membranes, having returned within the cavity of the womb, feel flaccid and wrinkled, and the bag of waters cannot be felt: the edges of the os uteri, which during the pain were hard, thin and sharp, are supple, thick, and rounded immediately after it. The nausea is suspended, but the belly, particularly the epigastrium, most generally remains very tender. Each pain reproduces the same series of phenomena and is succeeded by a more and more complete remission, which also grows shorter and shorter. The os uteri, which represents the resistance to be overcome, gradually yields; its dilatation at length becomes so complete, that there is no contraction betwixt the uterus and vagina. Thus is terminated the first stage of labour, the longest and most fatiguing period of parturition, but not the most dangerous or difficult.

§ III. SECOND STAGE, OR PERIOD OF EXPULSION.

681. In the first stage the womb performs almost the whole duty of the labour; it dilates the cervix, and forces the apex of the ovum to engage itself therein; it either does not solicit at all, or but very feebly, the contractions of the muscles, whose concurrence has not as yet become indispensable. In the second stage, the contractions in the first place become stronger, last for a longer period of time, are not so far apart, and yet are followed by a more decided calm; the courage returns, the sadness is dissipated; some women, oppressed with the want of rest, sleep quite soundly during the short interval between the pains; I once attended a lady in labour, who, having been three days and nights in the anguish of a most painful travail, slept several times on the morning of the fourth, notwithstanding that the contractions were carried to the highest degree of intensity, and there was scarcely more than one or two minutes between them. A feeling of weight and bearing down, by some referred to the pressure experienced by the cervix, but which depends rather upon that of the rectum and bladder, soon compels the woman to second her pains; and almost in spite of herself, to contract the abdominal muscles and make the most violent efforts.

682. The bag of waters, the only portion of the ovum which is not compressed externally, having no support whatever in the superior part of the vagina, bursts in the midst of one of the most violent pains; the fœtus, forced downwards by the same contraction, immediately takes the place occupied by the segment of the membranes, and by engaging in the passage like a stopper or plug, prevents the escape of the rest of the waters; and the head, if it be the presenting part, is then said to be at the crowning (*couronnement*;) the void thus produced in the womb is the reason why the labour seems to slacken for a little while; but when this void disappears, and the uterus is recovered from its *astonishment*, (I hope the expression will be pardoned,) the pains recover all their energy, and succeed each other with greater rapidity. Each one is ushered in with a general shiver; the severest ones are often preceded by another which is milder, and serves as a prelude to it; on other occasions we observe one stronger and one weaker, alternately, regularly, and without our being able to regard one as a sequel to the other. When they come on, the woman lays hold of any thing solid in her reach, plants her heels upon the mattress, seizes with her hands the sides of the bed or bolster, or the persons around her, to secure a *point d'appui*; she then throws her head back, draws a long breath, and all the levers of her skeleton being thus fixed, contracts, with all her power, the muscles of the belly, while the diaphragm, and all the muscles of her body act with the same energy; the neck and face swell, are engorged with blood, and become purple or livid; the jugular

veins acquire an enormous size ; the carotids beat violently ; the thyroid gland becomes engorged ; the eyes sparkle, grow red, and seem to start from their orbits ; all the symptoms of cerebral congestion become manifest ; the general circulation is strongly excited ; sweat sometimes pours from the skin, but only about the head, breast and abdomen, for the lower extremities, receiving less blood than common, not unfrequently remain below their ordinary temperature ; at length, when the contraction is just about to cease, this agitation gives place to rapid sobs, which soon restore calmness to the functions.

683. After a certain length of time, generally very short, another pain comes on, accompanied with the same anguish, and followed by the same phenomena. As it begins, a small quantity of liquor amnii is seen to flow off, because the child does not exactly fill up the cervix during the interval between the pains : but by forcing the presenting part to engage in the utero-vaginal orifice, the uterine contraction soon puts a stop to this discharge, which reappears towards the close of each pain, because the fœtus, ceasing to be pressed downwards, returns into the cavity of the womb. If the pains be somewhat strong, the head soon passes through the cervix into the upper part of the vagina, which gradually dilates to receive it, and it descends into the excavation, exerting an increasing pressure on the rectum and bas-fond of the bladder ; the bearings-down are now redoubled, strangury comes on, and cramps are felt in the thighs and legs ; if any fecal matters are contained in the rectum below the superior strait, they are mechanically forced out ; the amplitude of the vagina increases in every direction by the unfolding of the wrinkles, always, except during labour, observable on its interior. The head approaches the inferior strait, the coccyx retires backwards, the anus projects ; the whole perineum is elongated, and becomes thinner as the inferior angle of the vulva is carried forwards, and the plane of this opening at last comes to be almost parallel with the axis of the body, instead of representing, as before, the plane of the lesser strait of the dried pelvis ; the labiæ being put on the stretch are undoubled, and even drag a portion of the skin of the thighs towards themselves : the mons veneris is lessened in size ; but it is false, entirely false, to say that the nymphæ are also unfolded : at length a pain, which is stronger than any preceding one, which forces the woman to utter cries of despair, and which is composed of two pains of unequal violence, for which nature seems to have rallied all her remaining muscular power, triumphs over all resistance ; the most powerful contraction that has yet occurred brings the parietal protuberances on a level with the tuberosities of the ischia ; one more last degree of power is about to force them through, but that power is just about to diminish ; nature, who has almost overcome all obstacles, seems to be ready to fail in her

last effort; just as she is about to attain the object of so many exertions, she is seen ready to yield once more to the reactions of the perineum; but one more attempt of the organism gives rise to a new pain which comes to the assistance of the preceding one before it has quite ceased, as if to sustain it, and the head finally escapes through the vulva. In consequence of the vacuity which has just occurred in the womb, provided the body of the child does not immediately follow the head, it is not commonly expelled until after a calm of a few seconds or a few minutes, when a short and moderately strong contraction occasions its escape, together with that of the remainder of the liquor amnii.

684. The labour is finished. One of the most melting scenes, a scene most adapted vividly to affect the human heart, is presented to the eyes of the philosophical accoucheur. To those piercing cries and violent agitation, to those transports of despair, those excessive efforts, those inexpressible agonies, those dilacerating pains, which seem to be intolerable, instantly succeeds a delicious calm, full of charms, says M. Désormeaux, and interrupted only by the happy idea of being a mother. The new-born child cries, and all the sufferings of the mother so courageously borne are forgotten; passionate expressions of satisfaction are substituted for those of pain; sobs of happiness succeed to the sobs of despair; and this sudden transition from the extremest dread, from a frightful state of anxiety, to the height of joy and of the tenderest affections, is, in sensible and amiable women, one among those appearances which most imperiously demand our admiration for a sex whose other claims to it are so numerous!

685. *Duration of labour.* There is no occasion for me to remark that this general picture is far from being applicable to all women or even to all the labours of the same woman; most of these numerous phenomena are to be met with, chiefly among those who are robust, vigorous, young, and in labour for the first time: in others they exhibit very varied appearances. Their development requires a lapse of time which also presents very great variety in different countries and in different women.

The duration of labour is, according to the reports of travelers, much shorter among savages than among civilized people; among the Negroes and Indians of America than among Asiatics and Europeans; in hot climates than in cold countries; in Italy, Spain, and Portugal, for example, than in France, Russia, and Germany; in women who have passed their lives in luxury and idleness, than in those who live in the country, and are obliged to labour hard for a support. In general, labour lasts from four to eight or ten hours in Holland, England and France; it is about the same in Switzerland and Germany; so that Haller was evidently deceived when he stated that the duration of a labour is from an hour and

a half to two hours. The mean term of this function, therefore, as is remarked by M. Désormeaux, is about four hours.

The four most constant and essential phenomena of labour are, as may have been above seen, the contraction of the uterus, or *pain*, the *dilatation* of the cervix, the *formation of the bag of waters*, and the *discharge of glairy mucus*.

§ IV. OF LABOUR-PAINS.

686. In midwifery, the word *pain* is synonymous with *uterine contraction*; nevertheless it should not be forgotten that this is only conventional language, employed by physicians to make themselves understood by the vulgar, and that these two things are essentially distinct. It is true that pain is connected with contraction of the womb; that they begin, progress, decrease, and cease together, that the energy of the one is most commonly in a direct ratio to the acuteness of the other; but it is very certain, also, that the contrary may be met with, so that no labour can be concluded without the contraction, while many may be cited as having taken place without pain. Every body has observed, like M. Flamant, that in most women the contractions come on a good while before the pains. Nevertheless, it is by the pain that we estimate the contraction and its strength; the former is the sign of the latter. However, there may be numerous shades of difference in the intensity of the pains, without the strength of the contraction being on that account necessarily different. In a nervous and extremely irritable woman a very slight contraction sometimes produces the very severest pain; on the contrary, a woman of a lymphatic temperament, indifferent as to small matters, and who has but little sensibility, scarcely suffers at all, although the womb contracts strongly; some women, from an excess of timidity, fear, or pusillanimity, cry out aloud upon the slightest contraction of the womb, while courage and resignation lead others to bear the strongest contractions without complaining. Finally, there are a few, who, for the purpose of securing more attention or inspiring more compassion and pity, scream and worry themselves in a most extraordinary manner, although they, in reality, suffer but very little.—There are also those who arm themselves with artificial courage, who resolve beforehand not to complain nor cry out, no matter how strong the pains may be, and at the expense of life make the most incredible efforts to impose silence upon the most violent sufferings, and refrain from the most legitimate outcries; so true it is that charlatanism and ostentation find occasions for exercise even in human infirmities! It may also happen that the presence of strangers, or of persons displeasing to the woman in labour, of whom she is afraid, or with whom she naturally has no familiarity, restrains her, and prevents her from giving free expression to the sensations she experiences.

687. At the commencement, the pains are so weak and superficial that they have received the title of flies (*mouches*), doubtless in allusion to the slight sensation produced by the bite of that insect, or that occasioned by its creeping on the skin. They are then called, also, *preliminary pains*, *little pains*: characterized by a sort of shuddering of the body of the womb, they arise in the umbilical region, and are lost therein, or spread, so to speak, over the whole hypogastrium and flanks. At a more advanced stage, when the labour is fairly set in, the pains, which are longer, stronger, nearer together, and more decided, are called *preparative*; never was epithet better applied; their business is, in fact, to prepare for the expulsion of the ovum, or preside over the dilatation of the cervix; from the neighbourhood of the umbilicus they generally extend towards the sacro-vertebral angle, or to the centre of the strait; this is the period during which the woman is most impatient, cross, sad, worried, difficult to govern, and utters the sharpest cry, which perhaps depends upon the womb acting alone, and leaving to the woman the free exercise of her general sensibility.

At the end of the first stage, and more particularly in the second, the pains visibly change their character, assume the denomination of bearing or *expulsive pains*, and in fact announce that nature is employing all her resources for the expulsion of the fœtus. These pains, which are also designated as the *great pains*, are much stronger, longer, and more complete than those of the first stage, and are, besides, characterized by being separated by intervals more perfect, better marked, and more calm, by giving rise to strangury and tenesmus, or a sense of weight which brings the abdominal muscles into play, force the woman to bear down, and make exertions to assist the uterus. Notwithstanding their severity, they do not excite her irritability so much, and are borne with more resignation and patience. The women who seem carefully to avoid every preparative pain, are, on the contrary, anxious for the return of the expulsive ones; they invite and solicit them; they converse, are tranquil, and during the intervals between them, are even lively, and forget the dangers, a sense of which had previously caused them to be so downcast. Their cries are different from those they uttered in the first or second stages. The cries which accompany the first are sharp, and resemble those occasioned by any other species of suffering. Those of the second stage, on the contrary, seem to be suppressed like those of a person carrying a heavy burthen. The former are free and open, and take place during the act of expiration; the latter are restrained by the closure of the glottis, and can scarcely be heard except during inspiration; the former are expressive of suffering, the latter of exertion.

688. When labour approaches its termination, the pains, which

are sometimes of an extreme degree of violence, are pretty frequently accompanied with a kind of convulsive trembling, during which it seems as if the bones of the pelvis are about to separate or break, and all the genital organs threatened with immediate laceration, have been denominated *dolores conquassantes*, a barbarous and ill-sounding term, but strongly expressive of the state of the case; their only special character, however, is their high degree of intensity, for they do not otherwise differ from the expulsive pains, properly so called.

689. As has been already seen, the direction of the pains is not the same in every stage of the labour; they most frequently follow the great axis of the womb, or the occipito-coccygeal diameter of the fœtus, and consequently terminate at a point which is so much the nearer to the centre of the vulva, in proportion as the fœtus is nearer its passage through the inferior strait; whence it follows that an anterior obliquity of the womb is one of the most evident causes of those disagreeable pains that are called *pains in the back*, and to the consideration of which I shall return in another page.

Causes. The pains of labour are occasioned by the contractions of the uterus: but what is the nature of their mechanism? At the time of labour the womb is a muscle; but, in the natural order of things, muscular contractions are not at all painful. The heart, the diaphragm, the stomach, the intestines, the rectum, and the bladder give rise to pain by their contractions. The most violent contractions, even, of the muscles of the abdomen, in labour, are not painful; we cannot therefore look to the fleshy structure of the womb for the cause of the pain. Stein says that women would doubtless bring forth their children without any pain, were it not for the powerful resistance offered to the passage of the fœtus by the inferior segment of the womb and the neighbouring parts, which by their antagonism give rise to pain. According to Levret, Asdrubali, &c., there is not the least doubt that the seat of labour-pain is in the very orifice, *non vi cade questione alcuna che in esso orificio è il luogo positivo ove si articolano i dolori del parto, &c.*, and not in the body and fundus of the uterus, as supposed by most accoucheurs. Denman, in speaking of labour-pains, does not attempt to define their seat; he is satisfied with stating that, in labour, the degree of power can only be estimated by the resistance, the resistance by the pain, and the pain by the expression. So that his opinion, which is adopted by most of the English practitioners, and which Hopkins characterizes as the most rational one, is very nearly the same as that of Stein and Levret.

Hay and M. Bilon have endeavoured to prove that the seat of labour-pain is in the cervix much more than in the body of the womb; their principal argument is, that the former receives its nerves from the sacral plexus, which is one of the divisions of the

cerebral nervous system, while the latter receives its supply from the hypogastric plexus, which belongs to the ganglionic system, and which has no communication with the brain. Madame Boivin, who speaks from what she has experienced in her own person, advocates the same idea, and thinks that the contractions of the body and fundus of the womb are not more painful than those of the abdominal muscles and bladder.

690. If it be true that the cervix is endowed with a more acute sensibility; receives a more abundant supply of nerves than the rest of the organ, and is powerfully stretched by the contractions, and that all the efforts of the uterus are directed upon that point, it is not less so, that, during the strongest as well as the weakest contractions, the pains are equally felt throughout the whole extent of the womb. If the pressure of the fœtus and the tractions exerted upon the cervix were the only causes of pain, women ought not to suffer at all after the dilatation is completed; yet, notwithstanding, their most violent sufferings are experienced from that very period; and during the delivery of the placenta, is it in the neck that we are to place the seat of the pains?

691. Others have asserted that the pains of labour are owing to the compression of organs contained within the pelvis, of the nervous plexuses, for example. But when the lumbar or sacral nerves are compressed, pain is felt in the limbs and not in the excavation. The pains extend from above downwards, both at the beginning and end of the process, and occupy the whole hypogastrium, and not merely the lesser basin; as long as the head remains above the superior strait, where the fœtus presents transversely, or when it comes by the feet, we cannot refer the pains to this kind of compression. To maintain, with some writers, that they depend on compression of the nervous branches distributed upon the inner surface of the womb, is only to advance one of those numerous assertions, hazarded without proof, which are but too often met with in medical works.*

Thus the essential cause of labour-pain is wholly unknown; it is a question in physiology which deserves and requires new researches. What is demonstrated by observation is, that all parts of the womb, either unitedly or singly, may be the seat of pain during labour; that in certain cases, the stretching of the neck concurs, perhaps, more than all other causes in its production, and that pressure upon the neighbouring parts is not always unconcerned in it.

692. There is another long-debated question relative to the intermittence of the pains of labour. A. Petit says, that were not

* If, during labour, the finger be hooked in the dilating circle of the os uteri, and drawn so as to put it on the stretch, a pain is produced, resembling that which is felt during the grinding pains.—The most intense pain of parturition is the result of the extension of the vagina, the perineum and labia.—M.

the pain to cease after it had set in, or if there were only one single pain, the woman would sink under it, and could not bear it; whereas, being reduced as it is into fragments, the sum of her sufferings is really lessened; in other words, the pains of parturition are intermittent because they are not continuous, for that is all the explanation given by A. Petit. A physician whom Millot opposes with much warmth has entered more deeply into the question, asserting that the cause of the intermittence of the pains is found in the resistance offered by the ovum to the contractions of the womb. Others have since endeavoured to explain the facts as follows: when the womb contracts with much force, say they, the nerves between its different strata, or even on its inner surface, being compressed by the external surface of the ovum, soon produce a degree of numbness in them, that necessarily puts a stop to the contraction.

But the pains, in these cases, ought to be very long and very near to each other at the commencement of the labour, instead of being so fugacious and far apart, as the contractions are then extremely feeble; on the other hand, they ought, at the close, to be shorter and less frequent, inasmuch as the compression is then sudden and most violent; nor are the pains that accompany the delivery of the secundines, or the after-pains that follow delivery, and which still preserve the intermittent type, explained in a manner at all more satisfactory, under this hypothesis.

693. Buffon thought that the cessation of each pain was due to the detachment of the placenta; that is to say, according to this celebrated man, the object of each contraction of the uterus is to detach a small portion of the after-birth, and as soon as this detachment takes place, the pain, like the contraction, must cease for a moment. Two remarks suffice to show the little value of such a supposition. The placenta sometimes comes away before the fœtus, and the pains are not on that account less intermittent until the labour is concluded. In other cases the placenta retains its adherence even after the delivery of the child, which does not change the intermittent character of the pains.

694. In stating that the cause *exists in the cessation of the contraction of the muscular fibre*, as insisted on by Millot, who thinks he has made a great discovery, we fall back again to the *petitio principii* for which A. Petit has already been censured, above: this is to displace and not to solve the problem.

695. During the contraction the blood is forced back into the torrent of the general circulation, says Dr. Dewees; the womb grows pale, and the contraction ceases; a new affluxion takes place, and the contraction immediately returns, &c.; but this explanation, which in fact is perfectly similar to the one which I have been just now opposing, is liable to the same objections, and not at all more admissible.

696. In conclusion, we do not know the cause of the intermittence of the uterine contractions, any more than we do that of the contractions of the heart, the intestines, and the muscles in general, or that of all imaginable intermittence, whether functional or organic. Inasmuch as we cannot grasp a body strongly in the hand without being soon obliged to relax it, wherefore should it be supposed that the contraction of the womb does not require to be alternated with relaxation? The nature of the phenomena is similar in each of the cases; its cause must be identical, and I cannot perceive why we should with so much ardour seek for it in the one, when we have, in some measure, agreed to abandon it in the other. It is a question which will doubtless long remain unsolvable, but which belongs much more to general physiology than to tokology in particular.

§ V. OF THE DILATATION OF THE OS UTERI.

697. Pain is the first symptom of labour; but it is neither the most essential nor constant one; for, as has been pointed out by Levret, Denman and Hopkins, it may be conceived, that there may be cases in which it is possible for women to be delivered without any pain, whereas it is materially impossible for her to be so without the dilatation of the os uteri. This process of dilatation, which is wholly subordinate to the power of the uterine contractions, requires to be well understood. It is slow and not very perceptible at the commencement, but is effected with great rapidity towards the close of labour. It generally requires more time to enlarge it to the size of a crown piece, than to complete its dilatation, when its diameter is about three inches. The orifice, which is for the most part very thin and somewhat sharp, when touched at the beginning, especially in a first labour, communicates an impression like that which would be felt upon touching a ring of fine cord slightly stretched. In the latter half of the first stage it becomes, on the contrary, thicker, and sometimes forms a kind of roundish cushion, which seems to yield before the child's head, but gradually disappears when the head passes or engages in the strait. The very contrary of this is remarked in women who have had many children; the lips of the os uteri, which at first are soft and supple, still sometimes retain a thickness of several lines, even although the labour may be somewhat advanced; it is, however, only at a later period, when the bag of waters begins to form, that they begin gradually to grow thinner.

698. In both the above cases, the diminution in thickness is far from taking place with the same regularity on every point of the circumference of the circle. I have often seen its posterior half as thin as the edge of a sheet of paper, while its anterior semi-circumference formed betwixt the head and pubis a cushion from three to four lines in thickness. This inequality, which is in some

sort natural, and almost always to be met with in various degrees, ought not to be overlooked, whenever we attempt to determine the duration of the labour: by touching the anterior half of the cervix without carrying the finger far back, one might be led to prognosticate a pretty tedious time, while another person, after having explored the opposite side, would announce that the labour is just about to come to a conclusion.

699. The shape of the os uteri during the process of dilatation is no less variable than the thickness of its lips. It is pretty nearly circular where it corresponds to the centre of the pelvis; but more commonly it is oval, with the broadest part turned backwards, or to one side, right or left, according as the fundus is inclined in this or that direction; sometimes elliptical, especially when the child presents in a transverse direction; it exhibits, in other cases, certain inequalities which depend upon its different points not having the same consistence nor the same extensibility.

700. All those authors who have maintained that the fœtus is the efficient cause of delivery, have necessarily also admitted that it is the cause of the dilatation of the os uteri. The common people, mostly, still reason in this way, and Vigarous seems to be of the same way of thinking; but since it has been ascertained that, in the expulsion of the whole or part of a dead fœtus, the os uteri dilates just as it does for a living child, this opinion, now become superannuated, has been completely rejected. We have, says A. Petit, one decisive proof that the fœtus does not dilate the orifice, in the fact, that if we place a finger on the point of the ovum where it tends strongly to engage in the opening, we find that the head of the fœtus, instead of pressing into it, actually retires from below upwards, being repelled by the fluids which pass betwixt it and the womb in order to fill up the bag of waters.

This, however, does not imply that the child has nothing to do with the production of this phenomenon, but merely that it is not the active cause in it, and can only concur in it by being under the influence of some other power.

701. The real cause of it is to be found in the contractions of the womb. It is of the essence of fleshy fibres to shorten themselves, and tend to approach a straight line, when they contract; the womb is composed of curved fibres, the most numerous and strongest of which occupy its fundus and body, and are principally placed lengthwise; the cervix is the weakest part of the whole organ; the ovum is an incompressible body. Now, it is manifest that with such a disposition, the dilatation of the cervix must commence with the contractions of the womb. The vertical and oblique fibres, by their two extremities, which are their movable points, draw the horizontal fibres to which they are attached, or with which they are interlaced, upwards towards their middle, where is to be found the real fixed point. The transverse fibres,

in contracting upon the ovum, a smooth oval body, necessarily tend to slide towards its apex or towards its base ; but as they are at least as numerous above as below the middle transverse zone, it follows, that the circular fibres of the inferior portion of the uterus will, in any general contraction, be found to resist, alone, the efforts of all the longitudinal and circular fibres of its superior half.

On the other hand, as the ovum can only be pushed by the concavity of the uterine fibres towards the least resisting point of the organ, it engages in the partly open orifice, and becomes a powerful though secondary cause of the dilatation of the os uteri, and in this case acts like a wedge ; it is an inert force which acts in aid of a vital or organic force. Thus it may be admitted that the ovum is depressed while the os uteri is raised upwards ; in other words, that these two parts, under the influence of the same power, the uterine contraction, slide one upon the other, and that the latter must dilate in the direct ratio of the force which causes the former to descend.

At the commencement of labour, when the os uteri just begins to open, it is known to contract instead of dilating during the pain, but in such a way, notwithstanding, that it remains larger after the pain than it was before it. At a more advanced stage, when the bag of waters begins to form, we observe, on the contrary, that the os uteri dilates considerably during the contraction, and contracts somewhat as soon as it is over. The cause of this peculiarity is easily to be understood : at the commencement, the fibres of the neck still resist with great energy the action of the fibres of the body and fundus ; as the womb contracts at all points at the same time, and not in one or another of its planes, as A. Leroy supposed, or in different portions of its substance alternately, as taught by some others, the orifice, instead of dilating so as to allow the membranes to engage, on the contrary contracts, as if to prevent their passing out ; whereas, at a more advanced stage, when it is sufficiently open to permit the point of the ovum to lodge in it, the bag of waters unites in assisting the uterine contraction to force them to distend.

702. Immediately after the discharge of the liquor amnii, the head of the fœtus occupies the situation of the bag of membranes, fulfils its uses, and acts upon the neck in the same manner ; nearly all practitioners think this part less favourable for the dilatation than the segment of the membranes, inasmuch as it is not so even, as it does not form a tumour so equally stretched ; but we shall see, in examining the subject of the premature rupture of the ovum, that upon this subject observation requires to be consulted anew. It is principally from this very moment that the uterine circle is converted, in first labours, into a circular cushion of various thickness, and that the dilatation seems sometimes to

diminish to such a degree as to impress us with a belief that the labour is retrograding instead of advancing.

§ VI. OF THE DISCHARGE OF GLAIRY MUCUS.

703. The term glairy or mucous discharge is given to certain flakes of matter of a very clear yellow or greenish white colour which escape from the sexual organs during labour; this glairy matter occasionally resembles white of eggs slightly cooked, and differs from the mucus of the nostrils by being less adhesive, and by forming masses or lumps which are less coherent and more albuminous. It escapes in masses or flakes which tremble like jelly, come away especially during the contractions, appear in some instances several days before the onset of labour, of which they constitute one of the most certain preliminary signs,* become more and more abundant as the dilatation progresses, and at last, in a majority of women, become tinged with blood.

704. Nothing is more variable than the quantity of this discharge; sometimes a few lumps only are observed, and at others very large quantities of it escape with each pain; when in small quantity or wholly wanting, the labour is said to be a *dry* one; when abundant, it leads us to believe the labour will be soon terminated. Where red striæ are mixed with it, the woman is said to have a *show*, and the bystanders think it a good sign; or a proof that the labour will be quickly over. This notion, although not without some foundation, for it is generally observed about the close of the first stage, is far from being always correct; because there are cases where the red-coloured mucus does not appear at all, while there are others in which it occurs with the first pains.

705. Some authors have supposed that this semi-fluid matter escapes by transudation from the membranes, and upon leaving the ovum, becomes thickened in consequence of the increased temperature of the parts of generation; as if there was the least resemblance, either as to nature or appearance, between the water of the amnios and the mucous discharges! Others have believed that the fluids brought to the external surface of the ovum, meeting only with vessels of extreme tenuity whereby to penetrate within the amnios, decompose, become in some measure filtered, and that their finest and most subtle particles pass through the membranes to form the waters; while their grosser principles remain without, accumulate in the vessels nearest the internal surface of the womb, whence they are expelled during the contractions to give rise to the glairy discharges; but such an hypothesis need only be mentioned in order to show its futility. The glairy matter is furnished by the mucous membrane, and I cannot con-

* In a great many animals, both domestic and wild, parturition is also preceded by a discharge of mucous matters, which is sometimes very abundant.

ceive why its source should have been looked for anywhere else. The vagina is lubricated with it every moment during the lifetime of the individual; many women discharge pretty large flakes of it at the approach of the catamenia; it is not uncommon to find the womb filled with it in women who die in the unimpregnated state; in leucorrhœa and other diseased states, it sometimes exhibits the same characters, and runs off in as large quantity as during labour; finally, if it be of the very essence of organs lined with mucous membranes to secrete mucus, is it surprising that some of it should be formed in the sexual organs during labour?

706. The blood mixed with it comes neither from a rupture of the utero-placental vessels, for these vessels have no existence, nor from slight lacerations of the cervix, at least, most generally; for it is very common to find the bloody mucus appear before the cervix has been at all stretched: the mucus is coloured with blood in the same manner as the sputa in cases of pulmonic irritation, or as the mucous excretions of the nose in cases of irritation seated in the Schneiderian membrane, &c. Whether this blood be derived from the interior of the womb, or even from some cracks in the cervix uteri, it may be conceived that though it ordinarily goes only so far as to redden the mucus, it may nevertheless go to a much greater extent, so as to constitute a real hemorrhage.

707. The use of the glairy matter is to moisten and lubricate the parts over which the child has to pass, to increase their suppleness and extensibility, and make it more easy for the ovum to slide over the surfaces. Where the discharges fail to take place, the dilatation of the os uteri is always more painful, slower, and the organs more disposed to become inflamed; their superabundance, in general, indicates great softness of the tissues, weakness and a disposition to inertia; so that this phenomenon really deserves great attention in practice, and the accoucheur ought carefully to study its progress and its particular modifications.

§ VII. OF THE BAG OF WATERS.

708. The name of bag of waters is given to the protuberance formed by the membranes in the upper part of the vagina during labour. A true segment of a sphere, or of an ovoid figure, which was compared by A. Petit to a *tymbal*, this sac varies, however, in respect to its shape, for it is generally moulded upon the opening through which it tends to escape. Round, globular, and even, where the os uteri corresponds to the centre of the pelvis, and dilates in a regular manner, commonly elliptical, where the child presents transversely, wider behind and to the right or left in cases where the womb is strongly inclined in the opposite direction, it sometimes presents the appearance of a cone, somewhat elongated, or of a portion of intestine, or, as it is called, the shape of a *sau-sage* or *blood pudding*, particularly when the fœtus presents by the

feet, or also where the os uteri is very hard at the same time that the membranes exhibit a great degree of extensibility; it has, finally, been seen to enlarge beneath the orifice and become pyriform.

709. During the presence of a pain the bag of waters is hard, tense, and elastic; after the contraction is over it becomes wrinkled and contracts or disappears. Constituted like the rest of the ovum of the *anhistous* membrane, the chorion and amnios, its formation, according to some persons, depends upon the elongation of the membranes; but A. Petit has fully refuted this opinion, by demonstrating that the fœtal tunics are scarcely extensible; according to some other writers, and particularly the last-named author, every contraction causes a small quantity of water to exude from them outwards; a vacuum is gradually effected in the amnios; and the ovum being powerfully pressed in all directions, gradually engages, through the orifice, in the upper part of the vagina; but if this transudation really took place, the surface of the bag would become covered with small drops of water, or a kind of dew, in a word, it would become moist, during the pains; whereas, it is never drier than it is during the very strongest contractions; besides, it has already been seen that there is no analogy between the liquor amnii and the glairy discharges, into the composition of which A. Petit gratuitously supposed them to enter so readily.

710. The bag of waters, like the dilatation of the cervix, is produced by the contractions of the womb, and by a mechanism equally easy to be understood: by acting upon the periphery of the ovum as upon the throat of a pulley, the uterine fibres compel it to descend, while, on the other hand, the cervix, by dilating, is obliged to approach nearer to the fundus, and to leave a more or less considerable segment of the membranes outside of the orifice; the point of the fœtal ovoid, lubricated with mucus, forces the orifice to open a little, as the finger, when previously covered with a peach skin turned inside out, will force the fingers of the other hand to open when we try to push it betwixt them. It would, notwithstanding, be wrong absolutely to deny the extensibility of the tunics of the fœtus. On the contrary, every thing proves that they may sometimes extend to a considerable degree, and that it is in consequence of this elongation that the bag in certain cases affects the form of a cone or of a pear; I merely wish to say that this property is in general very slight. Even if it be true that the amniotic tymbral is almost always curved upon a cord that is shorter than the rest of the ovum, it is also true that this peculiarity, which seems to demonstrate that the membranes have yielded at that point, is owing to another cause; any one who has had occasion carefully to open a pregnant womb, has had an opportunity of being convinced that the mere weight of the ovum is sufficient to flatten it very considerably, as soon as it

ceases to be exactly supported by the surrounding organs: therefore, it is quite evident that a portion of the membranes may in this state of relaxation engage very well in the os uteri, and in a very small volume, without undergoing any real elongation.

711. After having wholly or in part, dilated the os uteri, the bag of waters, now become very large, and besides, ill-supported in the upper part of the vagina, yields to the impulsion of the liquid and breaks; the contained fluid escapes and the head of the child being at the same moment pushed forwards by the same effort, stops up the passage to the rest of the liquor amnii. But this rupture is far from always taking place at the same point, or under the same degree of dilatation, or at the same stage of labour in all women. The membranes may be too dense, too thick and too resisting, or too thin and fragile; the os uteri itself, which is sometimes very hard, rigid and difficult to distend, is, on the contrary, in other cases, extremely soft. In the most natural and regular state of things, the sac gives way about the end of the first, or commencement of the second stage; but it may open at the beginning, or not till the end of the labour. It happens, also, sometimes, that the membranes burst either one or several days before the appearance of the first pains, or that they do not rupture at all, the ovum being forced to pass whole through the straits of the pelvis.

The perforation commonly takes place in the centre, and in that case the sac becomes instantly empty; if it happens near the edge of the orifice or high up, it collapses only imperfectly, or appears again with each return of the pains, and the fluid escapes in small quantities only. When the tumour does not open until it nearly reaches the vulva, and the rupture does not take place in the centre, the head carries a segment of the membrane along before it, and the fœtus escapes covered with a sort of hood, and is born with a *caul*.

712. It was formerly predicted that a child born in this way would be lucky or unlucky according to the colour of the caul; that if it swallowed its caul previously reduced to powder, or always carried it about its person carefully enclosed in a box, it would be fortunate and always happy; that if it lost it, it would be unhappy in every thing, perhaps epileptic, constantly tormented by phantoms or infernal spirits; whence it follows, says Diëmerbroeck, that the midwives seize upon a portion of this membrane as a matter of right, in order to frighten the parents, and get more money from them by selling it to them at a dear rate. How many good women in the country are still imbued with this absurd prejudice? Should the caul extend over the mouth and nose it might, strictly speaking, hinder respiration from taking place, and perhaps cause the death of the child, as some authors have supposed; but to justify such fears as these, the lying-in

woman herself must be supposed to be insensible, and to have no body with her: this, therefore, is one of those possible misfortunes of which we are as yet in possession of no examples.

ARTICLE II.

OF EUTOCIA,* OR SIMPLE, FORTUNATE, OR SPONTANEOUS LABOUR
(NATURAL LABOUR OF THE FRENCH WRITERS).

In order that labour may terminate without foreign aid, a considerable number of conditions are required.

713. *On the part of the woman*, there must be no fault nor deformity in the pelvis; no serious affection of the womb, no scirrhus nor old cicatrices; the organ must enjoy a certain degree of energy; the general powers of the system must not have been exhausted, either by a profuse hemorrhage, or any long-continued disease; there must be no affection, making it dangerous for the woman to give herself fully up to the efforts she is compelled to make, and no accident must supervene during the labour.

714. *On the part of the child*, it is important that the occipitococcygeal axis should present one of its extremities to the straits, that the fœtus should descend with the head, the feet, the knees or the breech foremost; that it should not be hydrocephalous, gibbous or ascitic; not of a size disproportioned to the capacity of the pelvis; that there be not two heads attached to a single trunk, or two trunks to a single head, nor two children united together in any manner whatever.

715. Notwithstanding the number of these conditions, it is a rare thing for them not to be met with; for spontaneous child-birth forms a large proportion of the sum total of labours. We find in Merriman's Synoptical Table, that out of 1800 cases 1746 might have terminated spontaneously, since the child presented by the vertex in 1654 instances, four times by the lower extremities, twenty-three by the face, forty-two by the hip, and that in twenty-three cases the labour was only regarded as dystocical because they were multiparous pregnancies. 20,357 labours took place at the *Maternité* at Paris from 1797 to the end of 1811; of these 20,183 were natural. Out of 1897 that took place under the superintendence of Dr. Bland, 1860 were brought to a conclusion by the hand of nature. It is seen, therefore, that at the *Maison d'Accouchement* at Paris, difficult labours have occurred in the proportion of one to sixty-two; and at the Westminster Dispensary and Middlesex Hospital, according to Merriman and

* Eutocia, from *eu* "well," and *τοκος* "child-birth."—H.

Bland, out of forty-three labours, forty-two terminate spontaneously.

Madame Lachapelle, in her new tables, divides the labours that have fallen under her notice into two periods: the first, extending from the first Germinal, year IX, to the 31st December, 1811, comprises 15,662 cases, of which 15,380 were spontaneous, and two hundred and seventy-two difficult; the second, which extends from the 1st of January, 1812, to the 31st December, 1820, comprises 22,243 labours, of which 21,974 terminated without any artificial assistance, and two hundred and sixty-nine by the assistance of art. According to Boer, there were 958 cases from September, 1787, to the same period in 1790, in the Obstetrical School of Vienna; and of this number seventeen required turning, the forceps, or the perforation of the head; from September, 1790, to September, 1791, there were eighteen cases of dystocia out of 950 labours; from September, 1791, to September, 1792, out of 1015 labours, there were eight requiring turning, and seven the forceps; from the 1st January, 1801, to 31st December, 1802, among 2234 labours, thirteen were concluded by turning, eight by forceps, and two by the perforation of the head; from January 1st, 1803, to December 31st, 1805, out of 2,399 labours there were five cases of turning, eleven of application of the forceps, and three of perforation; in 1806, out of 2030 cases, seven required turning, two the forceps, and one the perforation of the head. At Heidelberg, out of 1296 labours mentioned by M. Nægèle, 1230 were natural, and sixty-four not natural; which gives the proportion of one to twenty, while the view by Boer exhibits, upon a total of 9590 only 102 requiring turning, the employment of the forceps, or the perforation of the head; which makes about one case of dystocia in ninety-five. But these proportions must be understood only as showing the practice of the authors who have published them, and not practice out of the public establishments. The discrepancies now existing in reports on this head are already sufficiently great; as may be evident upon reference to the London and Paris reports, and those of M. Boer, and those of the clinic at Pavia, for, according to M. Lovati, out of sixty-seven labours, twenty-two required to be assisted. However, the proportions found in private practice are still more variable, for, in great cities as well as in the country, the resources of art are called in, at least in one case in six, by some individuals, whilst others employ them only once in ten, twenty, or thirty, or even sixty, eighty or one hundred cases.

716. Admitting the result of the last period mentioned by the Vienna professor, as the farthest possible limit, as the last term, and beyond which nature cannot pass, we ask, can we rely upon enjoying equal advantages? On this subject I think it important that we should not confound the possible with the useful. Al-

though Boer's work proved that only one case out of one hundred and thirty-two labours was terminated by the assistance of art, it does not by any means prove that it would not have been better to have had recourse to it in some other of the hundred and thirty-one cases. Is it not certain that in many cases where parturition may, rigorously speaking, take place spontaneously, nature would, by a proper kind of assistance, conclude the function more happily both for the mother and the child? As to Merriman and Bland, who mention one case of dystocia out of forty-five, it is not proved that they were not in a hurry to act in many cases where the organism, if left to itself, would have fully sufficed for its own welfare; besides, everybody knows that patience is not the prevailing quality of English practitioners. Be this as it may, if the results obtained in the hospitals of Vienna and London be taken as the two extremes, it seems to me that we may admit those of the *Maternité* at Paris to be the mean term, and then it will appear that the active co-operation of the accoucheur will be useful in one out of fifty or sixty cases.

717. Now what is the reason that a different result is found to occur in private practice? Ought dystocia to be met with more frequently in women in easy circumstances, who live well in their own families, than in the poor, who are tormented with fear or remorse, and who go to the hospitals to be confined? No, doubtless; for every thing concurs to increase the number of difficult labours in the hospitals, and diminish it in private practice. Deformed pelves and all sorts of diseases of the genital organs are most frequently to be met with among the poorer class of women; many women, who would otherwise have remained at their own houses to be delivered, go to lie-in at the hospital, because they are of a bad conformation, or because they are fearful of having a dangerous labour; many others go there while in labour, because they are found, by the person originally called in, to need the assistance of art, and because they will have an opportunity of receiving that assistance better than they would at home.

718. But in the hospitals none, in general, except skilful persons, are appointed, who do not act for the mere pleasure of doing so, who repose in nature all the confidence that she deserves, and do not vainly interfere to assist her to do better; who know how to apply in proper season, and only where they are indispensable, or at least evidently useful, the resources of an art whose fundamental principle is, always to preserve, and never to destroy, except in cases of absolute necessity. But out of those public institutions, how many imprudent, ill-timed, unskilful, or rash manœuvres! Here it is an ignorant midwife, whose audacity and effrontery supply the place of knowledge, who cannot remain unemployed about the unfortunate women who are so thoughtless as to confide in her; there, it is a practitioner not less inapt, and

more dangerous than the old woman, inasmuch as he inspires confidence; such men, who are, unfortunately, too numerous, who call themselves accoucheurs, because they are incapable of becoming any thing else, take a pride in the number of difficult labours that they have terminated; they resolve to deliver by force, without giving nature, who is wiser than themselves, time to finish her work; and so that they may but seem to be necessary, fear not to obstruct, interfere with and torment the organs, so as to convert the most natural labour into a dangerous one!

There, again, it is an impatient practitioner, who, being in too great a hurry to wait, needlessly applies the assistance of art, so as to be sooner at liberty to pursue his occupation somewhere else. Sometimes it is a timid young physician, who, led away by the cries of the patient, her relations, and assistants, rather than lose the confidence he wishes to inspire, decides on resorting to measures he knows to be useless. Finally, on other occasions, there are wretches, equally criminal and despicable, who, in order to obtain reputation among the people, make haste to operate wherever they suppose they can profit thereby, without thinking upon the dangers to which they expose both mother and child. Such scandalous conduct as this, to the shame of the authorities, the laws, and of the establishments for instruction be it spoken, is daily observed far more in the large cities than in country places.

719. "I feel compelled," says Diderot, "by the interest that every honest man ought to feel in the birth of the citizens, to declare, that being urged by curiosity, I caused myself to be conducted one day to one of those midwives who take in pupils, and that I there witnessed samples of inhumanity which would be almost incredible among barbarians; these midwives, in hopes of attracting a greater number of spectators, and consequently of peasants, would cause their emissaries to announce that they had a woman in child-birth, and that the labour would certainly prove preternatural; the spectators collected, and in order not to deceive the general expectation, they returned the child into the womb, and brought it down by the feet! I should not dare to state this fact if I had not several times been a witness to it, and if the midwife had not the impudence to confess it to me. I therefore charge those who are appointed to watch over the disorders of society, to keep their eyes upon this one."

Would to Heaven the fact related by Diderot had never been repeated since, and that it had never been witnessed except among midwives! But let us draw a veil over a kind of conduct which lends but too much support to the idea of Denman, "that the abuse of art produces evils, more numerous and serious than the imperfections of nature."

Such, doubtless, are the chief causes that render dystocia more common in private than in hospital practice.

720. However, it must be confessed that the proportions between the different kinds of labour must of necessity vary from circumstances wholly accidental. Thus, of two practitioners who are equally skilful and equally circumspect, one may attend several hundred labours without being obliged to give any assistance to nature; while the other may be several times obliged to have recourse to the artificial means. Since I began carefully to notice the facts that have fallen under my own observation in tokology, I have found a very great difference between what has occurred at my amphitheatre and in my private practice. Out of the five hundred and fifty labours that took place in the *Hospital de Perfectionnement* while I had charge of it, and in my own amphitheatre, only eight required any assistance; in my private practice, on the contrary, out of less than three hundred cases, I had thirty cases of dystocia; which gives for the former only one difficult labour in upwards of sixty, and for the latter, so to speak, one for every eight labours. Such a disproportion is, however, not difficult to account for; at my public hall, and at the hospital, we received without distinction all the women who presented themselves, without any of them, except two, having previously undergone any examination; while the cases of dystocia that fell under my notice elsewhere, were almost all procured for me by my brethren, or by midwives, who, from excessive timidity, or for want of practice in the use of instruments, preferred calling on me rather than to attempt to deliver the women themselves.

SECTION 1.

Of Natural Eutocia (simple or spontaneous labour, the head of the child presenting).

721. What I have said concerning the attitude and position of the fœtus in the womb, makes it sufficiently evident, that the child ought properly to present its cephalic extremity to the straits of the pelvis, and that the cases where it descends in any other way should be regarded only as anomalies. It was correct, therefore, in Hippocrates and most of the ancient authors, not to give the title of natural labours except to those in which the head of the child came first, and to call all labours where the feet, the breech, or knees presented, non-natural. The moderns, having rejected this doctrine, depend upon their having misconceived the acceptance of the terms: the word *natural* is admitted by them to be synonymous with *spontaneous*, and consequently that labour where the pelvic extremity presents ought to belong to the class of natural labours.

722. There is no doubt that the principles taught by the father of medicine have been the cause of important errors in practice,

TABLE II.

Positions of the Fœtus according to different Authors.

1. BAUDELOCCQUE.	Vertex.	{	1. Occiput behind the left acetabulum.
			2. Occiput behind the right acetabulum.
	Face.	{	3. Occiput behind the symphysis pubis.
			4. Occiput before the right sacro-iliac symphysis.
	Feet.	{	5. Occiput before the left sacro-iliac symphysis.
			6. Occiput before the sacrum.
	Knees.	{	1. Forehead upon the symphysis pubis.
			2. Forehead upon the sacro-vertebral angle.
	Breech.	{	3. Forehead upon the left ileo-pectineal eminence.
			4. Forehead upon the right ileo-pectineal eminence.
2. GARDEN.	Vertex.	{	1. Heels behind the left acetabulum.
			2. Heels behind the right acetabulum.
	Face.	{	3. Heels behind the symphysis pubis.
			4. Heels in front of the sacrum.
	Knees.	{	1. Front of the legs behind the left acetabulum.
			2. Front of the legs behind the right acetabulum.
	Breech.	{	3. Front of the legs behind the symphysis pubis.
			4. Front of the legs before the sacrum.
	Trunk.	{	1. Sacrum behind the left acetabulum.
			2. Sacrum behind the right acetabulum.
	Vertex.	{	3. Sacrum behind the symphysis pubis.
			4. Sacrum in front of the promontory.
	Posterior surface.	{	1. Occiput.
			2. Neck.
	Anterior surface.	{	3. Breast.
			4. Loins.
	Lateral surface.	{	5. Sacrum.
			1. Face.
	Trunk.	{	2. Neck.
			3. Sternum.
	Posterior surface.	{	4. Abdomen.
			5. Genitals.
	Anterior surface.	{	1. Neck.
			2. Shoulder.
	Lateral surface.	{	3. Thorax.
			4. Flank.
	Trunk.	{	5. Hip.
	Vertex.	{	1. Head in front.
			2. Head behind.
	Face.	{	3. Head left.
			4. Head right.
	Feet.	{	
	Knees.	{	
	Breech.	{	
	Vertex.	{	1. Same as BAUDELOCCQUE.
	Face.	{	1. Forehead left.
			2. Forehead right.
	Feet.	{	3. Forehead front.
			4. Forehead back.
	Knees.	{	1. Heels, legs, or sacrum left.
			2. Heels, legs, or sacrum right.
	Breech.	{	3. Heels, legs, or sacrum front.
			4. Heels, legs, or sacrum back.
	Trunk.	{	Lateral surface.
			Posterior surface.
	Trunk.	{	Anterior surface.
	Trunk.	{	No subdivisions.
	Trunk.	{	1. Head left.
			2. Head right.
	Trunk.	{	3. Head front.
			4. Head back.

TABLE II.—Continued.

3. MAYGRIER.	{	Vertex. . .	{	1. Left occipito-cotyloid. 2. Right occipito-cotyloid. 3. Right occipito-sacro-iliac. 4. Left occipito-sacro-iliac.							
		Face. . .		Same as GARDIEN.							
		Feet. . .	{	1. Left calcaneo-cotyloid. 2. Right calcaneo-cotyloid. 3. Right calcaneo-sacro-iliac. 4. Left calcaneo-sacro-iliac.							
		Knees. . .	{ Same relations.								
		Breech. . .	{ Same relations.								
	{	Trunk. . .	{	Anterior surface. {	{	1. Belly. 2. Breast.	{	1. 2. 3.	} Same as GARD.		
				Back.—No subdivisions.							
				Lateral surface. {		1. Hip. 2. Shoulder. 3. Ear.				4.	
		4. CAPURON	{	Vertex. . .		{		1. Left occipito-anterior. 2. Right occipito-anterior. 3. Right occipito-posterior. 4. Left occipito-posterior.			
								Feet. . .		{	1. Left calcaneo, tibio, or sacro-anterior. 2. Right calcaneo, tibio, or sacro-anterior.
Knees. . .	{						3. Right calcaneo, tibio, or sacro-posterior. 4. Left calcaneo, tibio, or sacro-posterior.				
					Breech. . .						
	{			Face. . .	{	1. Chin behind and right. 2. Chin behind and left. 3. Chin in front and left. 4. Chin in front and right.					
		Trunk. . .	{			Posterior surface. {	{	1. Occiput. 2. Back.	{	1. Head front & left. 2. Head front & right. 3. Head back & right. 4. Head back & left.	
						Anterior surface. {		1. Face. 2. Breast.			
						Right lat. surface. {		Side of the head.			
			{	Trunk. . .	{	Left lat. surface. {		{		Shoulder.	{
Vertex. . .	{					Like GARDIEN.					
						Face. . .			{	1. Mento-sacral. 2. Mento-pubic. 3. Right mento-iliac. 4. Left mento-iliac.	
							Breech. . .				
5. BOUVIN.	{			Trunk. . .	{	Sternal surface.—Like BAUDELOCQUE; but no subdivision.					
		Poster. surface. {	{			1. Cervico-sacral. 2. Cervico-pubic. 3. Right cervico-iliac. 4. Left cervico-iliac.	{		1. 2. 3.		
						Lateral surface. {		1. Costal region. 2. Region of the shoulder. 3. Region of the ear.		4.	

TABLE II.—Continued.

6. LA CHAPELLE.	<div> <div>Vertex. .</div> <div>Face. . .</div> <div>Feet. . .</div> <div>Knees. .</div> <div>Breech. .</div> <div>Shoulder.</div> </div>	<div> <div>1. 1st of BAUDELOCQUE.</div> <div>2. <i>Idem.</i></div> <div>3. 4th of BAUDELOCQUE.</div> <div>4. 5th of BAUDELOCQUE.</div> <div>5. Occiput to the left.</div> <div>6. Occiput to the right.</div> </div>	<div> <div>Moreover there are intermediate, imperfect, and inclined positions.</div> <div>No other position of the trunk.</div> </div>
7. FLAMANT.	<div> <div>Vertex. .</div> <div>Breech. .</div> <div>Trunk. .</div> <div>4 surfaces.</div> </div>	<div> <div> <div>1. Occipital fontanel above the left acetabulum.</div> <div>2. Occipital fontanel above the right acetabulum.</div> <div>3. Occipital fontanel above symphysis pubis.</div> <div>4. Occipital fontanel above right sacro-iliac symphysis.</div> <div>5. Occipital fontanel above left sacro-iliac symphysis.</div> <div>6. Occipital fontanel above sacro-vertebral angle.</div> <div>7. Occipital fontanel above left iliac fossa.</div> <div>8. Occipital fontanel above right iliac fossa.</div> </div> <div> <div>Eight species, like those for the vertex.</div> <div> <div>Anter. surface.</div> <div>Poster. surface.</div> <div>Lat. surfaces.</div> </div> <div> <div>1. Face.</div> <div>2. Throat.</div> <div>3. Sternum.</div> <div>4. Abdomen.</div> <div>1. Nucha.</div> <div>2. Back.</div> <div>3. Loins.</div> <div>4. Sacrum.</div> <div>1. Cheek.</div> <div>2. Neck.</div> <div>3. Shoulder.</div> <div>4. Hip.</div> </div> </div> </div>	<div> <div>1. Head to the left.</div> <div>2. Head to the right.</div> <div>3. Head in front.</div> <div>4. Head behind.</div> </div>
8. DUGES.	<div> <div>Vertex.</div> <div>Pelvis.</div> <div>Face.</div> <div>Right shoulder. .</div> <div>Left shoulder. .</div> </div>	<div> <div>4 positions, like MM. MAYGRIER and CAPURON.</div> <div>4 positions.</div> <div>2 positions.</div> <div>2 positions.</div> <div>2 positions.</div> </div> <div> <div> <div>1. Loins to the left.</div> <div>2. Loins to the right.</div> <div>3. Loins in front.</div> <div>4. Loins towards the back.</div> </div> <div> <div>1. Vertex to the left.</div> <div>2. Vertex to the right.</div> <div>1. Back in front.</div> <div>2. Back to the rear.</div> <div>1. Back in front.</div> <div>2. Back to the rear.</div> </div> </div>	<div>Making in all 14 species.</div>
DUBOIS, DESORMEAUX, DEWEES.	<div> <div>Vertex.</div> <div>Face.</div> <div>Feet.</div> <div>Knees.</div> <div>Breech.</div> <div>Trunk.</div> </div>	<div> <div>Like BAUDELOCQUE.</div> <div>Like BAUDELOCQUE, except the subdivisions.</div> </div>	

TABLE II.—Continued.

The Author.	{	Head. 2 species.	{	Vertex. 2 species.	{	1. Occip.-ant. 3 var.	{	1. Left occip.-acet. 2. Right occip.-acet. 3. Occip.-pubic.											
									{	2. Occip.-post. 3 var.	{	1. Left fronto-acet. 2. Right fronto-acet. 3. Fronto-pubic.							
													{	Face. Only one species at the inf. strait.	{	Mento-pubic, 4 varieties at the superior strait.	{	1. Right mento-iliac. 2. Left mento-iliac. 3. Mento-pubic. 4. Mento-sacral.	
																			{
{	2. Sacro- post. { 1. Right. 3. var. { 2. Left. 3. Sacral.																		
		{	Trunk. 3 genera.	{	1. Lateral surface. One species. The shoulder. 2 varieties.	{	2 spec.	{	1. Head left. 2. Head right.										
										{	2. Posterior surface. One species. The back. 2 varieties.	{	2. Head left. 3. Head right.						
														{	3. Anterior surface. One species. The breast. 2 varieties.	{	1. Head left. 2. Head right.		
{																		{	

Besides these, there are inclined positions of the head, 1. The temple; 2. The forehead; 3. The occiput; and of the breech there are, 1. The hip; 2. Sacrum; 3. The parts of generation.

by leading practitioners to deliver by the head when it did not originally present, and in denying the possibility of a labour terminating alone, where the feet present; but, although they abandoned these ideas, have not the authors of the last century replaced them by others equally incorrect? Is it right, with Dionis, and A. Petit, to say that the fœtus may be extracted with as much or more ease by drawing it away by the feet, than if it descends with the head foremost; and that it is almost a matter of indifference as to the result, whether the cephalic or pelvic extremity presents? I do not think so, and I dare to say that such a way of thinking would be scarcely less dangerous in practice than the ancient doctrine.—There is no position of the child in which the labour has not sometimes terminated alone; and yet it has entered into no one's head to call a shoulder presentation, for example, a natural one. If a dystocia takes place, it is not because the child is in this or that position, but because the interference of art becomes indispensably necessary; a labour may be fortunate, and simple, or spontaneous, although the fœtus presents with its pelvic extremity; but strictly speaking, the positions of the head are alone natural or normal.

723. Delivery by the encephalic extremity contains two very distinct genera: in the first the summit of the head presents; while in the second, the face or some other part of the head offers at the straits.

§ I. PRESENTATION OF THE VERTEX.

1664 times in 1800 cases (Merriman); 1792 times in 1897 cases (Bland); 19,780 in 20,357 cases (Madame Boivin); 14,677 times in 15,652 cases (Madame Lachapelle); 20,698 times in 22,243 (Id.); 1210 in 1296 cases (Nægèle); 61 in 67 (Lovati); 392 in 400 (Hospital of the Faculty).

724. The presentation of the vertex is incomparably more frequent, as may be seen above, than all the others. Is any thing further wanting to prove that it is the only natural one, that which the organism always tends to produce, when nothing arises to interfere with the regular accomplishment of the grand act of reproduction? In this presentation the posterior fontanel tends to place itself in the centre of the pelvis. The principal diameters of the straits are adapted to the occipito-bregmatic and bi-parietal diameters. The occipito-mental diameter, and the occipito-bregmatic circumference should be parallel to the planes of the openings of the excavation, and to the axes of the straits. These general relations are always to be observed in regular positions of the vertex; but the occiput is far from looking to the same point of the pelvic circle in all cases, whence have arisen the various *positions* at present admitted in tokology.

Antecedently to the time of A. Petit, Solayres, and Baudelocque, accoucheurs were content to say that the occiput had come

in front or backwards, and the face was turned towards the sacrum or towards the pubis; and this old method of considering it, which M. Delpsch defends, is still generally adopted in England, in Germany, and in most foreign countries. It is therefore in France particularly and almost only in France, that attempts have been made to subject labours to the methods followed in natural history. But upon this, as upon all other subjects that are merely matters of convention, it has happened that the same fact has not been looked at in the same light by all observers. In the opinion of some we ought to admit six positions of the vertex; according to others, the number may be extended to twelve and even to twenty-four; many think that there should be only four, and some not more than two. Again, those who agree in respect to the proper number, differ in regard to the proper method of counting them or locating them. For example, Madame Lachapelle, who, like Baudelocque, admits of six positions, does not adopt the two antero-posterior positions of that author, but in place of them establishes two transverse positions, &c.; so that it is a pretty difficult matter for students to make a choice in such a conflict of authorities.

In a theoretical point of view it cannot be denied that the vertex may present itself to every point of the circumference of the superior strait, and consequently, that an infinite number of positions may be established if we choose; but the question is, how many of them would it be *useful* to adopt in practice, which are those we ought to *study* with particular care, and not how many we *might* admit. In the first place, it is evidently superfluous to suppose there are more of them than there are points corresponding to the ends of the four principal diameters of the pelvis; therefore it seems that the number established by M. Flamant, and which unites the classification of Baudelocque with that of Madame Lachapelle, might be considerably reduced. In fact, the occiput scarcely ever presents in more than two ways to the inferior strait; in one it looks forwards and lodges under the arch of the pubis; in the other, it is turned backwards, and presses the anterior edge of the perineum forcibly backwards.

Agreeably to this observation I have thought that all the presentations of the vertex might without inconvenience be referred to two fundamental positions: one, in which the occipital protuberance answers to some one point of the anterior semi-circumference of the superior strait; the other, where the same part is turned to the opposite portions of the strait. This modification, although slight, and in itself considered of very little importance, answers, notwithstanding, all the wants of both theory and practice; it enjoys the great advantage of not excluding the other classifications, and of accommodating itself to all the various doctrines.

The *occipito-anterior* position comprises the three first positions

of Baudelocque, or the two first of MM. Maygrier, Capuron and Dugès, and of Mesd. Boivin and Lachapelle. The *occipito-posterior* position naturally includes the fourth, fifth and sixth of Baudelocque, or the third and fourth of the authors just now mentioned. As to the lateral positions established by Madame Lachapelle and M. Flamant, they are at least very rarely, if ever, to be met with.

It is evident that the first, second and third have one common termination, and that their mechanism is in almost all respects similar. It is also undeniable that the fourth, fifth and sixth do not differ more than the others. I do not perceive, therefore, the utility in any way, of admitting these varieties, otherwise than as so many shades of the two fundamental positions, to which all others must of necessity be at last reduced. As to these, I think that no one ever attempted to confound them; their mechanism is so different, that the English accoucheurs, such as Burns, Merri-man and Bland, bestow the title of natural labour only upon the occipito-anterior position, while, according to them, the occipito-posterior position belongs to the class of preternatural labour.

1. *Occipito-Anterior Position.*

1634 in 1800, Merriman: 19,370 in 20,517, Madame Boivin; 14,253 in 15,652, 20,268 in 22,243, Madame Lachapelle; 60 in 67, M. Lovati.

Many foreign practitioners think that the occipito-anterior position is the only one we ought to abandon to the resources of nature. The causes of its great frequency are wholly physical and easy to be understood. The head is the heaviest part of the fœtus; the plane of the neck of the womb is always lower than that of the fundus; the head, therefore, ought to incline constantly towards the cervix uteri. The posterior half of the head is much more weighty than the anterior half. The weight of the hinder part of the trunk, during the intra-uterine life, is much greater than that of the anterior portion. When the woman is standing up, sitting down, or kneeling, and even when lying on her side, the anterior wall of the womb is much more inclined towards the cervix than its posterior wall: the back of the fœtus will therefore more frequently be found turned towards the front of the mother than towards her back. In quadrupeds, the young are often found to have their bellies downwards, and almost always come head foremost, although the womb is lower than the vulva; but it is to be observed that the abdomen in these species weighs most, and the head least. Another no less powerful cause of the frequency of this position is found in the proportional dimensions and inclinations of the head and pelvis; the abdominal strait being much larger in front than behind, and strongly inclined towards the pubis, it is quite natural that the occiput should commonly assume this direction, &c. The

cause which so often directs the occiput towards the anterior semicircle of the strait, is, therefore, not more difficult to understand than that which occasions the head to descend first; hence physicians were wrong to abandon their researches in relation to it.

A. *First Variety.*

Left occipito-acetabular position.

1st position of Baudelocque. Maygrier, Mesdames Boivin and Lachapelle; 15,809. in 22,343, Madame Lachapelle; 15,693 in 20,517, Madame Boivin; 36 in 67, Lovati.

In this position the back of the fœtus looks towards the front and left; its abdomen towards the back and right. The occiput is placed behind the corresponding ileo-pectineal eminence much more frequently than behind the acetabulum, and the top of the forehead or the anterior fontanel, rather than the forehead properly so called, looks towards the right sacro-iliac symphysis; the right side is to the right and in front, and the opposite one is behind and towards the left. Its great frequency seems to depend upon the rectum being in pregnancy commonly filled with feces, which force the forehead to incline towards the right side; such at least is the opinion of accoucheurs in the present day; an opinion which, besides, seems to be sustained by direct observation, since M. Dugès has seen the fœtus in Baudelocque's second position in two women who had the rectum on the right side: but this point is worthy of new researches.

725. In this position the head of the child does not pass through the pelvis without undergoing four particular motions. 1st, flexion; 2d, rotation; 3d, extension; 4th, restitution.

Flexion. Immediately after the rupture of the membranes, the uterine contractions must necessarily press the several parts of the fœtus upon each other; being pressed from above downwards, the spine causes the head to bend forwards so that the occiput sinks towards the centre of the pelvis, and the chin is squeezed more or less firmly against the breast. This flexion movement does not seem to have been well understood, even by the most esteemed authors. They teach us that antecedently to the very first contractions of the womb, the head should be disposed in such a manner, that its occipito-frontal and bi-parietal diameters should be parallel to the oblique diameters of the strait; whose axis would then be represented by the vertical diameter of the fœtus. According to them, the object of the flexion motion would be to alter all these relations; that is to say, to compel the occipito-mental and occipito-bregmatic diameters to assume the places of the vertical and occipito-frontal diameters, which would be much more favourable. In order that the above might be correct, it would be necessary for the chin, during pregnancy, to be habitually remote from the

breast, which it would not approach until the period of labour, otherwise the occipito-frontal diameter cannot be parallel to one of the diameters of the pelvis; but it is well known that the *fœtus*, in the natural state, is always doubled up, and that its chin is pressed upon the sternum. The flexion motion, therefore, really takes place long before the commencement of labour, and instead of being wholly effected, is only a little increased during labour.

726. In this way the occiput, by being depressed, soon corresponds to the centre of the superior strait; the occipito-bregmatic diameter is then parallel to the oblique diameter, which extends from left to right and from front to rear; the bi-parietal diameter represents the other oblique diameter; the occipito-mental diameter is parallel to the axis of the pelvic circle, and the occipito-bregmatic circumference corresponds to the plane of the strait.

727. *Rotation.* In this state the head is disposed in the best possible manner to pass without difficulty through the upper strait; by successive pains it is forced to descend a little; it reaches the excavation, and being soon stopped by the floor of that cavity, it executes the rotation or pivot motion; that is to say, it turns upon its great axis, the occiput sliding upon the left anterior inclined plane, from behind forwards and from left to right, so as to place itself behind the symphysis or under the arch of the pubis, while the forehead slides from right to left and from before backwards on the right posterior inclined plane, so as to get into the hollow of the sacrum. This is the moment when the sacral plexuses are most forcibly compressed, and when most women are affected with cramps in the legs and thighs.

728. *Extension.* Hitherto the flexion of the head has gone on increasing; henceforth it diminishes: the extension movement is about to begin; as it approaches the inferior strait the occiput rises, and by degrees causes the chin to abandon the front of the thorax; instead of continuing to bend forwards, the head tends to turn over backwards, in order that the occipito-mental diameter may be brought into parallelism with the axis of the inferior strait, without hindering the rest of the trunk from still following the course of the central line of the superior strait; the rectum and neck of the bladder being now more forcibly compressed than before, give rise to a straining, and tenesmus; the womb and abdominal muscles contract more violently than ever; the perineum distends, elongates, grows thin, and in this way prolongs the posterior wall of the pelvis to an extent of from three to four inches. The head being once engaged in the inferior strait, is no longer in the same relation to the diameters as before. Yet, it is well to observe that its great diameter and occipito-bregmatic circumference have not undergone any change of this sort, and that below as well as above they still represent the plane and axis of the strait. But instead of being situated obliquely, the bi-parietal and

occipito-bregmatic axes are so situated that the former corresponds to the direction of the bi-sciatic diameter, and the latter to that of the coccy-pubal diameter; which is the reason why at the end as well as at the beginning of labour the great diameters of the occipito-bregmatic circumference are always found to correspond to the largest diameters of the pelvis, and why the chief end of the rotation motion is to establish these favourable relations.

729. As the rotation takes place only at the expense of a twist of the child's neck, and not of its whole body, the shoulders retain their primitive direction at the superior strait, so that their great diameter is parallel to that oblique diameter which proceeds from left to right, and from behind forwards.

730. The efforts of the woman are now redoubled, the head gradually engages in the vulva, its back part being forwards, and slides down the plane presented by the anterior surface of the coccyx and extended perineum, which plane is strongly inclined forwards; the great labia are slowly effaced, and grow thin from their perineal commissure towards their pubal extremity; the nymphæ are forcibly pressed in an upward and lateral direction, but they do not unfold; they could sooner be torn and separated from the inner surface of the vulva; sometimes even the skin of the upper part of the thighs yields, so as to assist the pudendum and perineum in forming the sort of casque, with which the head remains partially covered until it escapes entirely from the pelvis; the parietal protuberances at length pass through the bi-sciatic diameter, and the head, now arrested by the resistance of the soft parts only is soon completely expelled. Whilst it is passing through the vulva, the posterior end of the occipito-bregmatic diameter continues to rest under the symphysis pubis, as upon a transverse axis, and rolls from behind forwards, as the occiput, the sagittal suture, the parietal protuberances, the anterior fontanel, the frontal bone, the orbits, the nose, the mouth and chin are seen to emerge in succession. When the occipito-bregmatic circumference is expelled, the anterior edge of the perineum, being drawn backwards by its natural elasticity, slides over the face, which affords it a plane inclined obliquely from the forehead to the chin, and approaching near the coccyx goes afterwards to place itself on the fore part of the neck, forcing meanwhile the head to turn over upon the mons veneris.

731. *Restitution.* The head, now freed from all constraint, and incapable of retaining the twist which had brought it under the arch of the pubis, soon recovers its natural relation to the shoulders and rest of the body, which had been temporarily changed; that is to say, its antero-posterior diameter again crosses the transverse diameter of the shoulders at right angles, as it did when at the superior strait. In one word, the occiput turns towards the left groin, while the chin is directed towards the opposite sub-iliac

space, and the title of act of restitution has been given to this rotation.

732. After a calm of a few seconds or minutes duration, the shoulders descend into the excavation, and perform a pivot motion upon the anterior right and posterior left inclined planes; the right shoulder being directed behind the symphysis or under the pubic arch, and the left on the front of the sacrum, forces the head to undergo a similar motion, which places it entirely crosswise, the occiput being to the left and the face to the right. In this direction they engage in the inferior strait. The right appears first under the pubis; the child's body bends on its right side so as to accommodate itself to the pelvis; the left shoulder comes down upon the perineum; the vertical axis of the thorax is parallel with the axis of the perineal strait; the vertical axis of the abdomen represents that of the superior strait; they pass the vulva together, and the rest of the body, rendered very slippery by the liquor amnii and sebaceous matter, and now representing only the point of a cone whose base has already escaped, is expelled by the power of the same effort, and the labour is terminated.

B. Second Variety.

Right occipito-acetabular position.

2d position of Solayres and Baudelocque; right antero-lateral of Madame Boivin; right occipito-anterior, Dugès; 3682 in 20,517 cases, Madame Boivin; 4659 in 22,282 cases, Madame Lachapelle.

733. Admitting that the situation might determine the occurrence of the first variety, the same cannot be said of the second. M. Dugès, it is true, mentions two cases, where, in this last named position, the bowel was transposed, being found on the right instead of the left side; but anatomical observations in daily repeated dissections show that such an anomaly does not occur once in every three or four subjects, as ought to be the case were it the only or even the principal cause of the position: and besides, when it has been met with, was it not rather an effect than a cause; and is it not more rational to attribute the second position to the contractions of the womb itself? If it be true, for example, as several facts carefully examined might lead me to believe, that previously to the commencement of labour, the occiput has no determinate position, and does not properly belong to one anterior variety more than to the other, may we not suppose that the uterus, being inclined to the right and in front, is more disposed to push the head towards the left than the right side of the pelvis? The impulse received by the fœtus in this inclination of the womb is necessarily directed from right to left; in which case the forehead, being arrested by the musculo-vascular edge found in the apex of the triangle represented by the abdominal strait in the

living subject, must compel the occiput to yield alone to the movement, and go to place itself opposite the left ilio-pectineal eminence. Without attaching any great importance to this idea, I should find it an easy task to advance a considerable number of reasons in support of it, and I think it deserving of the attention of those practitioners who love to give an account of what they observe.

734. However it may be, as to the causes of the right acetabular position, it is true that its mechanism differs but little from that of the preceding one; the child is impelled by the same power; the head executes the same movements, presents the same circumference in the different planes of the pelvis, and offers the same diameters to the principal diameters and axes of the straits, &c. But the occipital fontanel is turned to the right instead of the left; the occipito-bregmatic diameter, instead of proceeding from left to right, goes from right to left, and takes the place of the bi-parietal diameter; during the act of rotation its extremities slide upon the right anterior, and left posterior inclined planes, to conduct the occiput under the arch of the pubis, and the forehead in front of the sacrum.

735. At the inferior strait and vulva there is not the least difference remaining betwixt the two positions; but after the escape of the head, the occiput in its act of restitution turns to the right instead of inclining itself towards the left; the left shoulder, and not the right, comes under the symphysis pubis; the right side, and not the left, slides along the sacro-perineal curve; the face and whole anterior surface of the fœtus look towards the inside of the woman's left thigh, instead of turning towards the right; but nothing of all this process changes the proportional relations of the fœtal head to the maternal pelvis.

736. This variety is considered as less favourable than the other; some have said that it renders the labour slower and more fatiguing; when the forehead is turned towards the right sacro-iliac symphysis it is separated from the parietes of the pelvis only by fat and a layer of peritoneum, on which it slides without any difficulty, while in the second position, the rectum shortens the opposite oblique diameter a little. When in the first position, the occiput and forehead rest on two regular planes, equally solid and smooth; while in the second, the anterior part of the head depresses the rectum from above downwards, pushes it along before it, and folds it so as soon to form a kind of cushion, whose thickness is also increased by the fecal matters contained within it; it at least follows, that the left posterior surface of the basin is too soft to allow the head to glide rapidly down into the lower part of the excavation. The fœtus might here, to a certain extent, be compared to a solid straight stick, one end of which is applied upon a smooth hard plane, as for example a plate of glass, or on

the other hand upon an uneven or spongy surface, such as a woolen cloth or a mattress. In the former case, the stick would slide along without the least obstacle and under the slightest impulse, while in the latter it would not slide at all, or with difficulty. Further, it may be conceived that this state of the plane, on which the forehead is obliged to descend, may in the same way interfere with the act of rotation or the pivot motion, &c. All this may doubtless be true, but upon looking at the subject a little closer, we soon perceive that much is to be retracted of these pretended difficulties; for, 1. The thickness of the rectum when compressed by the head is reduced to a very small degree; 2. The matters with which it is filled are or may be evacuated at the very beginning of labour; and 3. The forehead in every case presses on the rectum, through the parietes of the womb, which does not rise in folds.

On this subject I think I ought to point out a contradiction found in the authors on midwifery. On the one hand, they say that the right-acetabular position is determined by the presence of the rectum on the right side of the sacrum, and on the other, that this same position is rendered less favourable by the friction of the head on the bowel on the left.

Remarks. The act of rotation in these two positions has not been interpreted in the same way by all authors. Madame Boivin and some others account for it by referring it to the contraction of the muscles that line the excavation. But it is evident that such an explanation is inadmissible; for, 1. This rotation sometimes takes place when the head is still above, and most generally does not occur until it is below the muscular bundles, to whose contractions it is attributed; 2. If the pyramidal and internal obturator muscles, by their contractions, could make the head revolve on its own axis, they would carry it across the pelvis, and not from front to rear. By referring it to the action of the sternomastoid muscles of the fœtus itself, an opinion has been advanced still less worthy of being combated than the preceding one.

Besides, what need is there for us to look for the cause of this movement, either to the muscles of the pelvis, or of the child's neck? The occiput turns towards the pubis, because it finds a vacant space there, while it is strongly resisted on the sides; it deviates from its original direction for the same reason that the forehead turns, at the superior strait, towards the sacro-vertebral angle. The form of the pelvis and the laws of mechanics give a perfectly clear account of this peculiarity: the anterior wall of the excavation, which is much shorter than the posterior, being deeply notched and somewhat hollowed out, any salient part of the head, when strongly urged by the contractions of the womb, could scarcely fail to engage in it, not only without the assistance of the

contractions of the inclined planes, but even in spite of those contractions, were they really to take place.

C. Third Variety.

Occipito-pubic position.

The 3d of Solayres, Baudelocque, &c.: 6 in 20,517, Madame Boivin.

737. The ancients regarded the occipito-pubic as the most frequent position, because they did not distinguish the two antero-lateral ones, and only judged from what is observed at the inferior strait. Baudelocque admitted it rather for the purpose of filling up his plan than from the testimony of his senses. Since his time MM. Gardien, Dubois, Flamant, Dewees, and Désormeaux, as well as Madame Boivin, have continued to describe it, at the same time admitting it to be very rare. In fact, out of twenty thousand five hundred and seventeen children, six only were found to present in this manner. MM. Maygrier, Capuron and Dugès have argued against the possibility of its occurrence, and Madame Lachapelle affirms that she never observed one single instance of it in more than thirty-six thousand labours.

The question, therefore, is, whether it is proper to retain it in a regular classification. The labours and researches of the moderns are almost the only ones that can be usefully consulted for the purpose of deciding upon this point; for as Baudelocque found no objections that he thought it worth while to combat, he neglected to cite any particular facts for the purpose of demonstrating the possibility of its occurrence. It is objected by MM. Maygrier and Capuron, that the forehead, being a solid and round part, cannot maintain itself in front of the sacro-vertebral angle during the expulsive contractions of the womb; that two round and equally salient bodies cannot slide upon each other without turning off to the right or left; in one word, that previously to the close of pregnancy, or at least at the very commencement of labour, the forehead of the fœtus is necessarily repelled by the promontory towards one of the sacro-iliac symphyses.

738. Without denying the force of these objections, I may, notwithstanding, be permitted to observe, that in the recent pelvis the sacro-iliac hollow is to a great degree effaced by the psoas muscles and iliac vessels; that the vertebral projection is thus considerably diminished; that the entrance to the excavation is then not so large behind as it is in front (72); that the womb being directed in conformity with the axis of the superior strait, rather than with the axis of the spine, and the head of the child habitually bent upon its breast, the forehead, at the commencement of labour, ought to correspond to the anterior surface of the first piece of the sacrum, and not to the sacro-lumbar projection,

properly so called; and therefore that it does not seem impossible for the head to descend in a direct position. I add, with M. Désormeaux, that authors have reasoned upon this case as if the pelvis were always the same, always regular. Where the vertebral angle is but slightly expressed, or thrown back, the sacropubic diameter is sometimes longer than common, without the cavity of the pelvis being really vitiated; in such a case the third position, far from being impossible, should, on the contrary, be the most natural and the easiest, inasmuch as the head, in engaging, always strives to place the great diameter of the circumference that presents parallel to the greatest diameter of the pelvis. Although Madame Boivin states on the one hand that she has met with it six times in twenty-five thousand five hundred and seventeen cases, on the other, Madame Lachapelle affirms that it is never met with. These contradictory assertions at least prove that the situation of the head at the commencement of labour has not always been recognized with certainty at the Paris *Maternité*. And how could it be otherwise? By the confession of all practitioners, it is very often impossible, previously to the rupture of the membranes, to tell whether the occipital fontanel is in front or behind, and *à fortiori*, whether it is to the right or left, rather than in the middle of the strait. Now, it is probable that Mesdames Boivin and Lachapelle could, themselves, have touched each of these thirty-six thousand women before the head had engaged in the excavation? To conclude, although it be true that the occipitopubic position, three very authentic cases of which are mentioned by Dr. Dewees, is of very rare occurrence, it is not less true that we are not, in the present state of science, authorized to deny its possibility; and as its mechanism is not altogether the same as that of the occipito-acetabular positions, I think it right to say a few words in regard to it.

739. When at the superior strait, the occipito-mental diameter and the occipito-bregmatic circumference are placed as in the two first positions, and always correspond to the axis and plane of that opening; but the bi-parietal diameter is situated transversely, and the occipito-bregmatic from front to rear, instead of being parallel to the oblique diameters; the pivot movement is not necessary and does not take place; the direction of the various axes of the head is the same at the end as at the commencement of the labour; as the shoulders look towards the iliac fossæ at the commencement, it is uncertain which way the act of restitution will take place; in fact, there will be none, because there was no previous act of rotation; however, as it is a rare occurrence for the shoulders not to place themselves one in front, and the other behind, before they pass through the inferior strait, the occiput, after a few moments of indecision, turns to the right or left, but without our being able

to know beforehand which ; after that, there is nothing peculiar in the rest of the labour.

740. *Remarks.* It cannot be denied that these three positions are in fact but shades of each other. In all three cases the head begins by flexing itself strongly down upon the breast, and ends by extending itself as it passes out under the arch of the pubis ; the occiput, a projecting part that always comes out first, never has more than two inches, or at most, two inches and a half to pass over before it reaches the arch of the pubis ; and in escaping from the pelvis, it slides on a surface that is plane and even convex, but not at all concave. Although in the first variety every thing is disposed in the most advantageous manner, the presence on the one hand of the rectum, and on the other of the bladder and sacro-vertebral angle, cannot after all, render the second and third any more difficult or dangerous.

2. *Occipito-Posterior Position.*

320 in 35,895 cases, Madame Lachapelle ; 203 in 20,517, Madame Boivin.

741. Of far less frequent occurrence than the occipito-anterior position, the occipito-sacral position is also much less easy, and less natural. In order to emerge first, the occiput is compelled to traverse the whole extent of the anterior face of the sacrum, the coccyx and perineum, that is to say, a surface of from seven to eight inches in length ; while in the other position it escapes after passing over not more than two inches. The posterior wall of the pelvis is deeply excavated, while its anterior half circle is rather convex than concave ; the summit of the head falls nearly at right angles upon each point of that wall, and the occiput meets a new resistance at every effort ; which is not the case when it is turned in front. The vertex cannot present itself at the vulva until a considerable part of the breast has descended into the excavation ; so that it is no longer merely the occipito-bregmatic diameter, but it is a line drawn from the anterior fontanel to the posterior part of the thorax that is referred to the antero-posterior diameter of the lower part of the excavation. Here the vertebral column is so strongly curved that it cannot but lose a considerable part of the force impressed upon it by the womb, before that power can reach the head. The head and trunk both together, and not the head alone, traverse the excavation and inferior strait ; and finally, the forehead is commonly too broad to fill up the top of the pubic arch accurately, and the coccy-pubic diameter may on this account lose as much as half an inch of its length.

742. The causes that occasion the posterior position to occur are little understood ; it is better frankly to avow our ignorance than vaguely to refer them to this or that shape of the pelvis, to

the direction, or disproportioned dimensions of the womb, to certain habits of the woman, to uncommon movements of the fœtus, &c. The only thing that can be affirmed about them is, that it is pretty common to meet with them several times in succession in the same woman. Besides, this is a question that requires some careful researches before it can be decided. Although the three principal varieties of this position differ only by slight shades from each other, I nevertheless think, but merely for the purpose of not deviating too far from generally adopted opinions, that I am bound to give a succinct explanation of its peculiar mechanism.

A. First Variety.

Left fronto-acetabular position.

4th position of Baudelocque, Gardien, Dubois, Désormeaux, Lebreton, Flammant, Madame Boivin: 3d of Maygrier, Capuron, Dugès, and Madame Lachapelle. 109 in 20,517 cases, Madame Boivin; 164 in 22,243 cases, Madame Lachapelle.

743. The left fronto-acetabular position is the most common of the three posterior varieties. It unites all the most favourable conditions of its species, and in this respect it excels all the others. The back of the fœtus being turned backwards and to the right, the abdomen towards the front and left, its left side to the front and right, and its right side behind and towards the left side of the womb, engages in the superior strait in such a way that the occipito-mental, bi-parietal, and occipito-bregmatic diameters, and occipito-bregmatic circumference are parallel with the oblique diameters, the plane and axis of that strait, respectively, as in the first anterior position. There is this difference, however, that the frontal extremity of the occipito-bregmatic axis occupies the place of the sub-occipital extremity, that the left extremity of the bi-parietal diameter has assumed that of its right extremity, that the anterior fontanel glides behind the ilio-pectineal eminence, instead of descending before the sacro-iliac symphysis, and that the posterior fontanel, instead of being slightly inclined in front and towards the left, is, on the contrary, turned more or less backwards and towards the right, which, as is evident, does not at all interfere with the proportional relations of the head and pelvis, and proves, that so far the posterior are not more unfavourable than the anterior positions.

744. After the dilatation of the neck and the rupture of the membranes, when the occipito-bregmatic circumference has passed the superior strait, the head meeting with a deep excavation, behind, is rapidly urged to the very bottom of the excavation, and at first the labour seems to progress more rapidly than in the very opposite position; but, from this moment, the difficulties mentioned above become more and more manifest. Instead of being

gradually replaced by the act of extension, as in the anterior positions, the flexion still continues to increase with every pain; whilst the forehead is arrested behind the pubis and the occiput is abutted against the front of the sacrum, the coccyx and perineum, which resists so as to force it to move forwards, the breast engages in the excavation, slides in some measure behind the face, opposes the turning of the chin towards the centre of the pelvis, and makes it very difficult for the occipito-mental axis to become parallel with the central line of the inferior strait, and especially with the axis of the vulva. The vertebral column being too much curved loses a part of the power impressed upon it by the womb; as it presses upon the head at an angle which becomes more and more acute, it cannot urge it onwards with the same degree of energy, even although the same degree of force might be employed.

The pivot movement takes place, nevertheless, and the forehead, or the *bregma*, sliding along the left anterior inclined plane, comes from left to right, and from behind forwards, to place itself under the arch of the pubis, whilst the vertex, or occiput, moving upon the right posterior inclined plane, proceeds from before backwards and from right to left, into the hollow of the sacrum; but this rotation is effected with some difficulty, because the forehead is too wide to adapt itself accurately to the sub-pubal notch; because, beneath the superior strait, the lateral regions of the hinder half of the pelvis are made up of soft parts, which do not repel the head with sufficient force towards the median line; lastly, because the extremities of the occipito-frontal diameter and its circumference, and not those of the occipito-bregmatic, roll in inverse directions upon the planes of the excavation, as is the case in the occipito-anterior position.

745. Notwithstanding so many unfavourable circumstances, the occiput descends, by bearing strongly upon the sacrum, the coccyx, and perineum, and the fœtus finally passes the strait. In this situation it is upon the posterior commissure of the vulva, and not upon the inferior edge of the symphysis pubis, that the occipito-bregmatic diameter now presses, slides, and reverses itself from above downwards and from before backwards; so that the posterior fontanel, the sagittal suture, the anterior fontanel, the parietal protuberances, the frontal protuberances, and the several parts of the face, are seen to appear in succession in front of the perineum. As soon as the chin is disengaged from the summit of the pubic arch, the act of restitution takes place; the face inclines towards the left groin, and the occiput towards the right sub-ischiatric notch; the left shoulder proceeds in front, under the symphysis; the right shoulder reaches the concave surface of the sacrum; the head, governed by the movement of the trunk, places

itself crosswise ; and the rest of the labour is concluded as it is in the right occipito-acetabular position.

B. Second Variety.

Right fronto-acetabular position.

5th position of Baudelocque, Gardien, Dubois, Désormeaux, Madame Boivin, &c. ; 4th of Maygrier, Capuron, Dugès, Madame Lachapelle, &c. : 92 in 20,517 cases, Madame Boivin ; 66 in 22,243 cases, Madame Lachapelle.

746. The right fronto-acetabular position, although rather more rare than the preceding one, is notwithstanding, more common, relatively to the opposite fronto-acetabular position, than the right occipito-acetabular is when compared to the left occipito-acetabular position. This peculiarity comes in support of the opinion I advanced when detailing the causes of the first position of the vertex : it may in fact be conceived, that if once placed behind, at the superior strait, the occiput may descend almost indifferently to the right or left of the median line, while, if turned forwards, it must be most frequently repelled towards the left side.

In this position the back of the fœtus is directed to the left and backwards, the right shoulder to the left and forwards ; the biparietal diameter represents the left antero-oblique diameter ; the occipito-bregmatic is parallel with the right antero-oblique ; and the lesser circumference and occipito-mental diameter are parallel with the plane and axis of the strait. The head, when engaged in the excavation, revolves a half quarter of a circle upon its vertical axis. The occiput, sliding upon the left posterior inclined plane, proceeds to lodge in the hollow of the sacrum ; while the bregma, rolling upon the right anterior inclined plane, is directed to the symphysis pubis.

Upon emerging from the vulva, when the act of restitution takes place, the occiput gradually turns towards the inside of the left thigh, and not the right, as in the fourth position. As to the rest of the labour, it is terminated like the former, except that the front of the fœtus at last looks towards the right, and its right side directly in front, whereas in the other variety, directly the reverse is observed. Moreover, it is said to be rather more difficult, in consequence of the presence of the rectum, which must retard the progress of the occiput.

747. M. Nægèlé maintains that the fourth position of the vertex is much more common than the second, and that the French accoucheurs did not perceive it, because, being led away by the authority of Baudelocque, they did not perceive that the former of these two positions commonly converts itself into the right occipito-acetabular position, as soon as the head gets through the superior

strait.* These assertions of the German professor ought to be taken into consideration, not that they are perfectly correct, for even provided the very numerous observations collected at the Paris *Maternité* could not be cited as proofs of the contrary, the form of the pelvis and the specific gravity of the fœtus would alone prevent the admission of such an opinion, until its correctness had been irreversibly demonstrated by multiplied facts; but they should be taken into consideration, because it appears certain, that when the occiput reaches the bottom of the excavation, it does, in fact, in some instances, turn towards the acetabulum instead of proceeding towards the posterior median line. I have already observed and pointed out to many students the reality of this phenomenon, so as to leave no doubt upon the subject. Upon passing the pelvic circle, the head by degrees inclines to one side, and places itself exactly crosswise, soon after it descends into the excavation. This pivot motion continues, under the influence of the uterine contractions; if it be the fourth position, the posterior fontanel gradually reaches the arch of the pubis, by gliding from behind forwards, and from right to left, along the right anterior inclined plane, and on the other hand from left to right for the fifth, &c.

748. I am ignorant of the causes to which such anomalies ought to be attributed; I have never found any thing peculiar in the conformation of those women who have exhibited them; the labours have progressed regularly, and there was nothing unusual in the weight of the children; I think I have only noticed that from the very beginning of the labour, the antero-posterior diameter of the head was much nearer to the bis-iliac than to the sacro-pubic line of the strait, and that the pubis, being slightly depressed above, seemed to favour the anterior rotation, by the hollowness of the arch, and by the distance to which the acetabula were separated.†

749. The knowledge of these conversions ought not to be overlooked in practice: in the first place, because, as they are favourable, we may in some instances be enabled to promote, and even to enforce them whenever such a thing is possible; in the next place, because they afford a very natural explanation of the mistakes, which we have been heretofore compelled to attribute to the ignorance of those who committed them. For example, it pretty often happens that two accoucheurs, called to the same woman, one at the commencement of the labour and the other at its close, announce, each, a different position; that one announces

* My own experience in midwifery is in perfect accordance with M. Nægèle's assertion on this point.—M.

† I have in a good many instances observed the fetal head to change its position during labour, so as to bring the occipital fontanel from the left acetabulum quite over to the right one, and then go back again to the original position. In an ample pelvis the child has power to change the position of its head very readily, until it is fairly within the vagina, where it is held too firmly to admit of such spontaneous rotations.—M.

an occipito-anterior, and the other the contrary position, and that upon seeing the head emerge, one of them remains convinced that he had been really deceived. Notwithstanding, both of them may have been right, for the fourth or fifth position might really have existed, although the labour terminated in the second or first. It would be wrong, however, to generalize this remark too far, and apply it to all cases where the escape of the fœtus contradicts the diagnosis established by the practitioners from whom the woman first receives attention : it would be too convenient a resource for the concealment of real mistakes, and one of which the inept and ill-taught would not fail to avail themselves at the expense of truth.

C. *Third Variety.*

Fronto-pubic position.

6th position of Baudelocque, MM. Gardien, Dubois, Désormeaux, Madame Boivin : occipito-sacral of MM. Flamant, Lebreton : is rejected by MM. Maygrier, Capuron, Madame Lachapelle, and M. Dugès.

750. All the arguments advanced by authors against the possibility of Baudelocque's third position apply equally well to the sixth. If the forehead cannot maintain itself upon the sacro-vertebral angle, it is, *à fortiori*, impossible for the occiput, which is much narrower, to maintain itself in that situation and not to deviate either to the right or left. But as the impossibility of the occurrence of the occipito-pubic position is far from being a matter of demonstration, so also is the same thing to be admitted as regards the opposite position.

Sometimes the sacro-vertebral angle, in the living subject, projects but very slightly, a fact to which sufficient attention has not been paid, and it is evidently wrong to reason as if the head were not already flexed upon the breast from the very beginning of labour, and as if it were the occipito-frontal, and not the occipito-bregmatic diameter, that is at the very commencement parallel to the antero-posterior diameter of the strait.

751. If it be true, as we learn by the *touch* at our amphitheatres, that, in many women, we can readily feel the most prominent part of the fœtal head over the centre of the pelvis, quite above its abdominal opening, long before the commencement of labour, I cannot perceive how the sacro-vertebral angle can constitute an insurmountable obstacle to the sixth position. It must therefore be admitted, at least, as a possible shade, if not as a real variety.

752. Its mechanism, moreover, scarcely differs from that of the two oblique varieties ; the posterior surface and occiput of the fœtus being, from the beginning, turned directly backwards, there is no occasion for the head to perform its pivot movement in the excavation, so as to engage in the inferior strait ; the shoulders

pass through the superior strait parallel to the bis-iliac diameter, and there is no act of restitution without, any more than there is an act of rotation within the pelvis, and if the face comes at last to turn towards one of the thighs and the occiput towards the other, it happens so because the trunk, in revolving on its vertical axis to place the shoulders in an antero-posterior attitude, necessarily carries the bi-parietal diameter in the same direction.

It is less favourable than the corresponding oblique positions, only because it renders the forehead and face more liable to be turned downwards, and to permit the great diameters of the head to become parallel to the smallest ones of the pelvis. When they attributed the difficulties accompanying it to the friction of the face behind the pubis, accoucheurs of past ages, doubtless, had not reflected on the state of flexion in which the head is found to be placed; for it would have been easy for them to see that it is the anterior extremity of the occipito-bregmatic diameter, and not that of the occipito-frontal diameter, that must rest upon the hinder part of the pubic articulation.

753. *Remarks.* Besides these six varieties, there would be a great many intermediate ones, provided the occiput were obliged, in each of them, to correspond to some indicated point of the pelvic circle: in effect, if there be some of them that we can bring in relation with the extremities of the four principal diameters of the strait, I cannot perceive why eight others might not be established betwixt those just now mentioned; and this number once agreed upon, there is no reason why we might not add sixteen others, and so on *ad infinitum*. But it is quite enough to make a particular position of all the cases where the occiput looks towards any portion of the left anterior quarter-circle of the pelvis, another for the right, and a third and fourth for the posterior half of the pelvis; since these varieties, which differ more in degree than reality, ought, after all, to be considered as mere shades, constantly changing, before the close of labour, into occipito-anterior, and occipito-posterior positions: so that, in fact, the four diagonal positions of the superior strait, when reduced to the two antero-posterior ones of the inferior strait, constitute the whole of those, the study of which is really important. We are not, however, on this account, to deny the existence of the directly anterior and transverse positions established by Baudelocque, M. Flamant, and Madame Lachapelle.

754. I have treated in greater detail of the occipito-pubic and sacral positions than of the occipito-iliac positions, because their mechanism presents some peculiarities which it is well not to be ignorant of, for the doctrine of Baudelocque being extensively known, it might be attended with some inconvenience, were I to overlook positions admitted by that author to exist, which, though they are of rare occurrence, yet really do occur, and substitute

for them others equally rare, and which, moreover, soon become confounded with the oblique ones.

755. When Madame Lachapelle says that the occipito-iliac are more frequently to be met with than the fronto-acetabular positions, she must surely be misled by some preconceived idea. Previously to the descent of the head into the excavation, it is often difficult to say whether the occiput looks exactly towards one of the extremities of the transverse diameter, rather than a few lines forwards or backwards of it, or to know whether it constitutes a transversal position, rather than an oblique one very much inclined : further, as the author herself admits that the head remains but a short time thus directed towards the iliac fossæ, either the occiput or forehead soon deviating in front to gain the pubic arch, and the left occipito-iliac position being the most common of the two, it is manifest that the transverse positions are completely converted into the corresponding oblique ones, and that they do not deserve a particular description.

756. *Anomalies.* In some positions of the vertex the movements of the head seem to deviate wholly from the ordinary march of a labour; for example, it may happen, and indeed it does happen pretty often, that after having passed obliquely through the superior strait, it places itself transversely in the excavation, where it remains for a longer or shorter time previously to performing its pivot motion; in other cases this motion is not performed at all, or but imperfectly; the head, therefore, passes the inferior as it did the superior strait diagonally, or even emerges from it in a transverse position, so as to bring the occipito-bregmatic into parallelism with the bi-sciatic diameter. In some other instances, the occiput upon escaping from the vulva turns in a direction directly contrary to that it ought to pursue, provided the restitution were regular; it was in this way that Solayrès and Baude-locque saw, and that I myself have seen, the face, in a left occipito-acetabular position, turn towards the woman's left thigh, as it ought to do in the second position, and *vice versa*; so that from the commencement to the close of labour, the fœtus performs about half a spiral turn, from behind forwards, and from left to right, or from right to left, according to the position. Baude-locque was mistaken when he attributed this irregularity, on the one hand, to the smallness of the fœtal-head, or on the other to the excessive amplitude of the pelvis; I have had occasion to notice it in women whose labours were very slow, and whose pelves were not larger than necessary for the transmission of the child. Might it not depend upon some peculiarity in the form of the inferior strait or excavation, some anomaly in the uterine contractions, or rather of the impulsion originally communicated to the fœtus; and which, after having first produced the common act of rotation, might be strong enough to compel the head and

shoulders to turn so as to perform a complete semicircular turn? In the present state of tokological science it is impossible to answer this question.

§ II. PRESENTATION OF THE FACE.

4 in 1800 cases, Merriman; 5 in 1897, Bland; 74 in 20,517, Boivin; 103 in 22,243, Madame Lachapelle; 58 in 6,555, Boer.

757. It never until lately entered any one's imagination to trust the delivery to the hands of nature, where the face of the child presented at the superior strait of the pelvis; it is true we find in Mauriceau, De la Motte, and Smellie, cases of spontaneous termination of the labour where the face presented; P. Portal and Deleurye also maintained that these positions are not in general very dangerous; Røderer and Petit even agree that some of them may terminate without any assistance; but Baudelocque and Stein having professed that they cannot possibly terminate spontaneously except where the fœtus is very small or the pelvis very large, it has happened that MM. Maygrier, Gardien, Capuron, &c., continue to class them among the preternatural labours.

758. Such was the state of the subject when Madame Lachapelle laid it down as a principle, that this sort of labour is nearly as easy and as natural as that by the vertex, and affirmed, that out of seventy-two cases of this kind, forty-two were concluded without danger either to the mother or child. M. Désormeaux ranged himself on the side of the midwife in chief of the *Maternité*; and the same ideas are found in the work of Boer, who, after saying that delivery by the face is very simple and very natural, describes its mechanism in the following manner: *Caput fœtus, ex quo supra in margine pubis hæret, per illam ita transmovetur, ut frons sensim incurvaturam ossis sacri vergat. Utque facies aperturæ infra appropinquat, mentum propemodo admittitur sub pube, simul atque frons cum vertice supra perinæum protruditur. En facialis omnis partus exordium, progressus ac finis!*

M. Chevreul expresses himself in nearly the same manner; "I can enumerate eighteen labours," says he, "that occurred since 1792, either in my private practice, or at the *Maternité* at Angers; where the children presented the face, and which terminated naturally. All these children were of the common size; fifteen of them were born alive; three were dead, but appeared to have been so previously to the commencement of labour."

However, a distinguished professor, M. Capuron, has recently come out with great vigour in opposition to this doctrine, endeavouring to demonstrate, upon geometrical principles, that delivery by the face, according to the mechanism pointed out by Boer, is generally impossible, provided the woman does not receive any artificial aid. But no geometry can hold good in this case; as nu-

merous facts exist, they are evidently possible. I have myself seen seven cases of face presentation; the children were born alive and well; I trusted the cases to nature, and no particular difficulties were observable.

This kind of labour, therefore, is not only possible, but also for the most part quite easy. M. Capuron and many others have thought otherwise, because they did not perfectly understand its mechanism, and were misled by the idea that the breast in such cases must necessarily pass the strait at the same time with the head, which is wholly incorrect. It is clear, when the head presents at the superior strait, with the chin towards the pubis and forehead towards the sacrum, that the fronto-mental diameter which is only three inches, or if prolonged to the anterior fontanel, three inches and a half, is parallel with the sacro-pubic diameter, equal to four inches and a half, and that it occupies the situation that belongs, in vertex presentations, to one of the diameters of the occipito-bregmatic circumference. So far there is no disadvantage in a face presentation. But at a later period, when the head descends, the chin gets below the pubis before the occiput reaches the excavation, and the breast is still at the superior strait while the face is actually engaging in the inferior pelvic circle; then the front of the neck, being stopped by the lower edge of the symphysis pubis, compels the vertebral column to react upon the posterior part of the head, which it urges from behind forwards so as to force it through the vulva, by presenting to that opening a series of circles, whose principal chords are measured by the vertical diameter of the head. The laws of mechanics, therefore, in accordance with facts, permit us to class face cases among the spontaneous labours.

759. According to Deventer the causes of this presentation are to be sought for in the obliquities of the uterus, which, from the very beginning of its action, cause the extremity of the occiput to lodge upon the margin of the strait, and thus oblige the face to descend first. According to M. Gardien, the cause lies much more in the inclination or obliquity of the fœtus itself than in that of the organ which contains it. Madame Lachapelle, who rejects both of these hypotheses because she saw the face presenting at the upper strait in two women who died previously to labour, attributes it to the circumstance that the anterior obliquity of the womb being very common, the weight of the occiput must in such cases prevent the chin from remaining applied against the sternum, and must bring the mento-bregmatic diameter into parallelism with the sacro-pubic diameter from the very commencement of labour. It seems to me that all these opinions have some foundation, but that none of them suffice to explain all the facts, and that it is for the most part impossible to say why the face and not the occiput presents.

760. The face positions being in fact only reverted vertex positions, it is plain that we must for both admit the same number of species and varieties. Authors, however, have generally described only four; and they have rarely agreed as to the manner of arranging them. Some make them correspond to the four oblique positions of the vertex; others, as Smellie, Stein, Baudelocque, and MM. Gardien and Désormeaux, dispose them transversely, and from front to rear, and admit a *right mento-iliac* and a *left mento-iliac position*, as well as a *mento-pubic* and a *mento-sacral position*.

Perhaps, in studying the subject, there is some advantage in this latter mode of classifying them; but it is important in practice to know, 1. That the antero-posterior positions are rare, so much so, that Madame Lachapelle has never seen a single case of that kind, although Rœderer, Deleurye, Stein, &c., admitted them as very common, and as the easiest; 2. That if they do sometimes occur at the commencement, as in one case that I saw, they soon become converted into lateral positions; 3. That the mento-sacral position, which Stein gives as the best, and of which one case is related by Smellie, is altogether impossible without this conversion; and, 4. That in the iliac positions, the fronto-mental diameter is more frequently directed obliquely than transversely.

761. It ought also to be known that the face does not always present in full; that the forehead often sinks lower than the chin; that the contrary obtains in other cases; that in some instances, also, it descends with one of the cheeks foremost, &c., and that these anomalies constitute the varieties pointed out by Madame Lachapelle; and which may be either primitive, that is, they may exist from the very commencement of labour, or secondary, that is, not become manifest until after the first efforts, and even at a very advanced stage of parturition; and that the last case ought to be considered as possible, for example, in vertex presentations with the occiput backwards, or where the pelvis is very large, and also where the sacrum is too concave.

A. *Right Mento-Iliac Position.*

3d of Baudelocque, M. Gardien, Madame Boivin; 53 cases in 22,243, Madame Lachapelle.

762. In the right mento-iliac position, which evidently is a deviation of the first or fifth of the vertex, and ought therefore to be, and in fact is the most common (41 to 31; 58 to 45), the face comes down transversely into the excavation; but as the length of the neck would not allow the chin to get down to the level of the tuberosity of the ischium without dragging the upper part of the thorax through the superior strait, without throwing the occiput forcibly backwards on to the chest, without putting the whole

length of the vertical diameter of the head, protracted as far as the sternum, into the situation that ought to be occupied by the fronto-mental diameter, a rotative movement soon takes place, and changes the relations of all these parts: the chin and front of the neck slide from behind forwards upon the right anterior inclined plane, and lodge in the top of the arch of the pubis, while the bregma slides in an opposite direction, upon the left posterior inclined plane, and proceeds to occupy the anterior surface of the sacrum. Then the forehead, followed by the sagittal suture and occiput, passes gradually down the plane presented to it by the anterior surface of the coccyx and perineum, in front of which all these parts are in succession disengaged. As it emerges from the vulva, the chin rises, by degrees, towards the mons veneris; the hyoidian region, or lower extremity of the vertical diameter, really forms the centre of the semicircle described by the head as it clears the strait, and the rest of the labour terminates as in the corresponding positions of the vertex.

B. Left Mento-Iliac Position.

4th of Baudelocque; M. Gardien, Mesdames Boivin, Lachapelle, etc.; 31 to 41; 45 to 53.

763. Where the chin looks towards the left iliac fossa, the position of the face answers to the second or fourth of the vertex. It is rather more frequently met with than the preceding one, but does not differ from it except that the chin slides on the left anterior inclined plane, and the bregma on the right posterior one, so as to place the head in an antero-posterior direction, in order to pass the perineal strait; and that the act of rotation must be somewhat easier, if, as is asserted, it be true that the presence of the rectum may impede that of the right occipito and fronto-acetabular positions of the vertex.

It is said that the head has been, but very rarely, seen to emerge from the vulva in a diagonal or even transverse position, but it does not appear to me certain, that, in these cases, the observers were not deceived by an incipient act of restitution.

C. Mento-Sacral Position.

1st of Baudelocque.

764. The third position is extremely rare, 1. Because the occipito-pubic position, which must give rise to it, is itself not very common; 2. Because if it be true that it does sometimes or even pretty often exist at the very beginning of labour, the contractions of the womb soon transform it into a diagonal or transverse position; 3. Because, if it should maintain itself for any length of time, the chin, which is too prominent not to lodge against the sacro-verte-

bral angle, would force the occiput to descend, or swing towards the centre of the pelvis, and at last place itself in the third position of the vertex ; 4. Because it is evidently impossible for the chin, which must always appear first at the vulva, to descend in this attitude as far as the anterior edge of the perineum, unless, as M. Désormeaux remarks, the fœtus be an abortion ; for the breast would then be entirely within the pelvis at the same time with the head, and Stein would have satisfactory reasons to maintain, with the ancients, that face labours cannot, without danger, be abandoned wholly to the powers of nature.

In fine, all the face positions may be reduced to one fundamental one, a species which comprises two, or three, or five varieties, right and left mento-iliac, mento-pubic, and if it be preferred, two diagonal ones, all of which have, for a last result, the arrival of the chin under the arch of the pubis, in order that the head may pass the inferior strait without obliging the breast and shoulders to descend antecedently thereto into the bottom of the excavation.

765. *Remarks.* In practice we also meet with certain positions that belong neither to those of the occiput, nor to those of the face, properly so called. The head sometimes descends, half turned over, so that neither the occipito-bregmatic nor fronto-mental diameters correspond to those of the straits, but it is the occipito-frontal diameter or circumference, or even, in some cases, the occipito-mental diameter that assumes that relation ; sometimes, on the other hand, the head too much flexed occasions a part of the nucha to present together with the occiput. It pretty frequently happens, also, that one of the parietal bones, or the ear, or the temple, being nearly parallel with the horizontal plane of the pelvis, engages first. Lastly, in this respect there are an infinite number of shades of difference, which I do not think it necessary to speak of at great length, because it suffices to indicate them merely to show that they are referable to some one of the correct vertex or face positions ; or again, because they most commonly become causes of dystocia.

SECTION 2.

Of Unnatural Eutocia (presentation of the pelvis).

611 cases in 20,517, Madame Boivin : 1390 in 37,895, Madame Lachapelle ; 65 in 1800, Merriman ; 54 in 1897, Bland ; 194 in 6555, Boer ; 61 in 1296, Nægele.

766. The pelvic extremity of the fœtal ovoid comprises the feet, the knees and the breech ; when it presents first at the straits of the pelvis, the labour can most generally be terminated alone, as has been noticed by practitioners in all ages ; but this does not

warrant us in saying with the moderns that these presentations are natural. Without pretending with the ancients, that delivery by the feet is always dangerous, or that we should endeavour to bring the head to the strait, in preference to letting the fœtus escape feet foremost; without referring with Avicenna to the examples of Agrippa and Nero, or that of Richard of England, &c., to prove that children born in this way necessarily become tyrants, criminals, or wretches who are a disgrace to human nature, I think we shall be at least forced to admit, with Celsus, Moschion, Paré, De Saint Germain, &c., that this kind of labour is less favourable than that where the other extremity of the occipito-coccygeal diameter presents. It would surely be both a very erroneous and a very dangerous doctrine, to say, with Rhodion, Dionis, A. Petit, and Boucher, that delivery by the feet is easier than by the head.

767. All accoucheurs agree that the child is oftener born dead in pelvic presentations than in those in which the vertex descends first. At the Paris *Maternité*, out of eight hundred and four children, expelled in this manner, only five hundred and eighty-one were born living, whilst out of a sum total of twenty thousand six hundred and ninety-eight vertex presentations only six hundred and sixty-eight were still-born.

768. After the rupture of the membranes, the pelvic extremity of the fœtus never presents the same evenness, the same resistance, or the same rounded form as the head, to the openings of the pelvis; it consequently acts to much less advantage on the cervix to finish its dilatation. When the head presents, the uterine contractions act upon it, through the medium of the spinal column, as upon a solid body; while the pelvic extremity, on the contrary, being soft, supple, and flexible, yields, and is in some measure crushed down. In vertex presentations the most voluminous part, that which is best calculated to bear all sorts of pressure, escapes first. In pelvic presentations, on the contrary, the point of the cone advances first, so that the fœtus progresses more slowly in proportion as the labour advances. In the former case the remaining parts of the child are delivered immediately after the abdomen, and neither the thorax, nor abdomen is in danger of suffering any injurious compression; in the latter, the belly and the thorax being obliged to overcome the resistance of the cervix, can rarely support such a degree of pressure beyond a few minutes without the greatest danger; the liver and other viscera of the abdomen must react upon the great vessels; the circulation in the cord, which is pressed against the breast, and the action of the heart, cannot but be very much impeded, if not absolutely suspended. In delivery by the head, the spine represents a long handle of a lever, to which the womb applies itself forcibly until the termination of the labour; in presentations of the pelvic extremity, before the head has completely passed through the supe-

rior strait, it is in a great measure beyond the influence of the uterine contractions; at the very moment where the greatest amount of uterine power is wanted, all the benefits of it are lost. Finally, the pressure sustained by the parts, in succession, from below upwards, necessarily drives the blood up towards the head, and determines that state of congestion so often met with in children that are delivered footling, and which Osiander and M. Flammant erroneously attributed to the action of cold air upon the child's body previously to the delivery of its head.*

These disadvantages cannot be denied, or unknown by any well-informed practitioner: it would be wrong, however, to conclude from the above, that the assistance of art will be always required merely because the pelvic extremity of the child presents; on the

* The view taken here of the causes of death which so frequently operate effectually on the *fœtus*, in pelvic presentations, omits one of the most considerable, and which appears to me to be readily conceived of in the following manner. When the vertex descends first, in any woman, the child begins to breathe as soon as the mouth and nostrils are exposed to the air, and it generally cries before the shoulders are born; but, when it is enabled to reach the air, it becomes instantly a matter of indifference, as to its security, whether the after-birth be detached or not. Now, it most generally happens that the after-birth is wholly or partially detached, by the constriction of the womb long before the hips and legs of the child are expelled: for the womb is by this time grown so small, that the placental superficies of it can no longer hold the placenta.—This, as I have said above, is a matter of indifference to the child as soon as it can communicate with the atmosphere.

In a pelvic presentation on the contrary—it is a matter of the greatest consequence to the child's safety, that the detachment of the placenta should not take place so early, for, although the feet or the breech is born, the child's head having no access to the air, it perishes with a real, I might say a double asphyxia, to wit, its placenta is separated from the mother, and its lungs receive no air. I am far from asserting that the placenta is detached in all cases at so early a stage of labour as that which I have indicated, though I am free to utter my opinion that in the vast majority of cases, the placenta is separated by the time the head is fairly born, in ordinary vertex cases.

Such are my views of the principal causes of death of the *fœtus*, in breech and footling cases.—It follows from the premises, that in all such labours the child should be withdrawn so soon as it can be conveniently done.

I am sure that in my own practice the results are far more favourable than those cited by M. Velpeau. I do not think that one-tenth of the cases of pelvic presentation under my care, prove fatal to the *fœtus*—and I attribute this success to the custom which I have adopted, of procuring my forceps in good time, so as to have them at hand, wherever the first examination discloses the existence of a pelvic presentation.

I make very slight tractions on the shoulders in order to facilitate the expulsion of the head—and as soon as I find that the head is not likely to come down I grasp it in the forceps and deliver it at once. I have safely delivered a number of children who I think would have been born dead, but for such a precaution.

In a breech case, the life of the child will be lost by a few minutes delay in the delivery of the head, and the tractions which are effected by pulling by the shoulders, can never be of very considerable force, without injuring its cervical spinal marrow. Hence, whenever any considerable extrinsic force is required, it should be applied by means of the forceps.—M.

contrary, I think that we should always, in such cases, abandon the labour to the resources of the organism, except an opposite conduct should be imperiously demanded by some peculiar circumstances. If the rupture of the membranes does not occur until after the complete dilatation of the os uteri, if the position is regular and the pains good, the fœtus will, indeed, pass out without running much more risk than in a delivery by the head; but if the membranes give way very early, if the least traction be employed under the pretext of hastening the delivery, it is certain that difficulties will be infinitely multiplied, and the life of the child seriously compromised. This is a point which young students, as well as practitioners, ought never to lose sight of. This, also, is one of the motives that have induced me, both in my lectures and in this work, to deviate from the ideas generally received among us in relation to pelvic presentations of the fœtus.

769. Previously to the time when De La Motte, Petit and Baudelocque had demonstrated that the somerset motion described by their predecessors was a mere chimera; as long as it was supposed that the fœtus naturally remained squatting on the sacro-vertebral angle until the end of the seventh month of pregnancy, there was no difficulty in accounting for the presentations of the breach, knees or feet; to explain their occurrence, it was sufficient to say that something had prevented the somerset from taking place; that the child, either through forgetfulness, weakness, or something else, had allowed the opportune moment for performing this pretty feat to elapse; but at present, when we cannot resort to this subterfuge, we are brought to confess that the causes of presentations of the pelvis are but little known.

770. It is probable that, about the period when the length of the occipito-coccygeal diameter of the fœtus begins to exceed that of the transverse or horizontal diameter of the womb, it may happen that the head of the child, being carried upwards by some sudden movement, by the decubitus of the woman, or some other cause, cannot resume its original position. It has been observed at the *Maison d'Accouchemens* at Paris, and I have had occasion myself to notice it, that presentations of the pelvic extremity are much more common in abortions and in twin pregnancies than in simple labours occurring at full term; and this remark might perhaps be used to sustain the above explanation; but how can we refer the cause of this anomaly to the fœtus, or to mere peculiarities of attitude in the mother, in those tolerably numerous cases, where all the deliveries of one individual terminate in this way, and when it is well understood that a woman having once been delivered of a breech presentation, warrants us in fearing that it will happen so to her again? Would it not rather be reasonable to seek for this cause in the conformation of the womb or pelvis in such a case?

771. The positions of the pelvic extremity may, like those of the head, be divided into regular and irregular or deviated ones. In the former, the thighs are applied against the abdomen, the legs are bent upon the thighs, and the breech and feet present together at the superior strait, and the great occipito-coccygeal axis is parallel to the axis of the pelvic circle. In the latter, the fœtus is more or less inclined to the right or left, forwards or backwards; the posterior surface of the coccyx, or one of the tuberosities of the ischia, or the forepart of the legs and the sexual organs, corresponds to the centre of the pelvis; most generally, the latter are reduced to the former as soon as the waters are gone off; in other instances they maintain themselves for a much longer time, retard the labour, and, in certain cases entirely prevent it from terminating spontaneously.

772. The regular positions may also become irregular, especially after the rupture of the membranes, either because the feet continue to descend pressed against the breech; or because one of the legs rises up on the anterior surface of the trunk, while the other is extended, and descends first; or because one of them becomes situated transversely, so that the knee and heel press on two opposite points of the strait; or because one knee descends together with a foot or a buttock, or one of the legs is turned up in front, and the other back; or lastly, because this last-mentioned condition is met with concurrently with one knee, one foot, or a foot and buttock together, &c., but in general, they remain frank until the conclusion of the labour. The two legs and thighs then extend, and the feet escape first. At other times, again, the legs rise upwards and the child comes away doubled, or by the breech properly so called. In other instances, the knees alone descend together, the feet continuing to be applied to the ischia, which constitutes presentation of the knees: whence it results, that there are really no primitive presentations of the feet nor of the knees, and that until the rupture of the membranes, there are no other positions except those of the breech.

Thus these various kinds of positions ought to be considered only as shades of a single and even fundamental species, *the presentation of the pelvic extremity of the fœtus*.

773. Instead of six, Baudelocque proposes only four positions for the breech, feet and knees; in the first the back looks forward and to the left, forwards and to the right in the second, directly forward in the third, and directly backwards in the fourth. MM. Capuron and Maygrier have rejected the two latter, and substituted for them two diagonal positions, which renders their classification of the pelvic positions, in all respects similar to the one they thought proper to establish for the head. Madame Lachapelle has acted differently; she retains Baudelocque's third and fourth; but in place of the first and second, she admits two

others, in which the back looks directly towards the right, or towards the left side of the pelvis.

One thing seems to me to be proved by this discrepancy: it is, that we might, strictly speaking, establish, as M. Flamant has done, eight positions of the breech. But, on the subject of the pelvic extremity, I shall repeat what I said in relation to the cephalic extremity: disagreement has arisen on the subject, because, instead of seeking every possible number and kind, we ought to endeavour to ascertain only such as it might be useful to know.

774. Admitting that it were not perfectly correct to say, with Mauriceau, Dionis, De la Motte, and Levret, that the loins are, in breech cases, most generally turned backwards, MM. Capuron, Maygrier, Dugès, &c., would not be less in the wrong to assert that they as well as the sacro-anterior positions are purely hypothetical: Asdrubali, who has noticed them, partakes the opinion of Mauriceau, and of Smellie; and the tables published by Madame Lachapelle show that, out of 1390 cases wherein the pelvic extremity presented, there were thirteen anterior, and twenty-six posterior ones.

775. Thus the direct positions, either anterior or posterior, are possible, as well as the diagonal ones, and the breech may present in as many ways as the head. Like those of the head, too, these positions may be reduced to two principal ones: the one *sacro-anterior*, and the other *sacro-posterior*. This is the way the ancients understood them, and if Baudelocque could be satisfied with one position for the posterior semicircle of the pelvis, I see not why the three positions of its anterior semicircle should deserve a more special description. In the first, second, and third positions of that author, whether the hips engage just transversely or somewhat obliquely, it always happens that one of them looks to the left and the other to the right, exactly as in the three posterior varieties. In the first case the occiput always ends by placing itself behind the pubis; in the second it proceeds to lodge on the fore part of the sacrum, as is observed to happen in the corresponding positions of the vertex. The anterior position differs essentially from the posterior one; but the last two being admitted as possible, it is quite useless, as to practice, to establish others, except as shades of them. Notwithstanding, out of respect for received opinions, I shall not fail to point out the particular mechanism of each one of these shades, and instead of uniting all the positions of the pelvic extremity in one single genus, I shall for the same reason continue to examine separately those of the feet, the knees and breech.

§ I. PRESENTATION OF THE FEET.

538 out of 37.895. Madame Lachapelle; 23 in 1800, Merriman; 18 in 1897, Bland; 68 in 6555, Boer.

776. What I have stated in relation to the dangers of delivery by the pelvic extremity, applies strictly to presentations of the feet. In that case the child resembles a cone or a very sharp wedge, descending from its point towards its base; the bag of waters being generally less regular in shape, more elongated than in other positions, and almost always rupturing before the dilatation of the neck has had time to be completed, it follows that the pressure upon the fœtus constantly increases from the root of the lower limbs up to the superior part of the chest, and that the viscera are violently repelled from below upwards; in one word, the parts of the woman are dilated, and a passage for the head opened by the hips, the belly, and the thorax. If the abdominal and thoracic cavities were formed of bones as solid, and if their horizontal diameters were of length equal to those of the head, they would bear the pressure of the os uteri with quite as little inconvenience, and the child would not run much more risk in one way than in the other; but this is not the case, and I cannot too strongly insist upon the disadvantages of such presentations.

1. *Calcaneo-Anterior Position.*

347 in 37,895 cases, Madame Lachapelle.

A. *First Variety.*

Loins in front and towards the left.

1st position of Baudelocque, Gardien, Maygrier, Capuron, Madame Boivin and M. Désormeaux.

777. In the first position of the feet, the anterior surface of the fœtus looks backwards and to the right of the womb; the right hip is turned towards the left sacro-iliac symphysis, and the left hip towards the right acetabulum; whence it follows, that if the presence of the rectum were the principal cause of the great proportional frequency of the first vertex position, the first position of the feet ought to be more rarely met with than the second; however, the contrary is observed to happen; for, by the statement of Madame Boivin, in a total of 234 labours by the feet, the left calcaneo-acetabular position alone occurred 135 times.

778. The heels, which previously to the rupture of the membranes are more or less near to the tuberosities of the ischia, do not actually engage within the os uteri, until the moment when the waters run off, and sometimes even much later than that. If the amnios does not give way until after the orifice is properly dilated, the legs and thighs follow the feet immediately, and the hips, which traverse the superior strait in a diagonal position, soon reach the vulva. In the contrary case, all these parts descend slowly, and by degrees, with each returning pain. The fœtal

pelvis, before it engages into the inferior strait, generally performs a rotation upon the right anterior and left posterior inclined planes of the excavation; the left hip occupies the arch of the pubis, while the right hip goes to fill up the hollow of the sacrum. The whole child bends upon its anterior or left side; the belly next passes through the os uteri; the elbows, pressed against the ribs, or somewhat in front upon the breast, yield to the contractions of the womb, and descend along with the thorax into the excavation. The shoulders follow the chest through the abdominal opening of the pelvis, where they remain in the same direction they affected at the commencement of the labour, that is to say, diagonally, the right before the left sacro-iliac symphysis, and the left behind the right acetabulum. When below the strait, they are subjected to the same pivot motion as the hips, and like them, are soon placed in the antero-posterior direction. The head, strongly flexed, follows the upper part of the breast; the ovoid which it represents engages with its apex foremost; its occipito-mental diameter is parallel with the axis of the strait, the plane of which soon becomes parallel to the occipito-bregmatic circumference; the bi-parietal and occipito-bregmatic diameters measure the oblique diameters; in fine, the relations of the head to the upper pelvic circle are absolutely the same as in the first position of the vertex; there is only this difference, that the small, instead of the large extremity of the cone represented by the head, *videl.* the chin, the face and base of the skull—instead of the superior oval and occiput—advance foremost.

779. The root of the umbilical cord, the abdomen, and the lower part of the thorax are now emerged; the left elbow appears at the top of the pubic arch; the right elbow, arm and shoulder slide gradually along the sacrum and perineum, and successively appear in front of the posterior commissure of the vulva, which strongly raises the trunk of the fœtus up towards the mons veneris; so that the shoulder that is in front does not commonly disengage itself until after the other, although the corresponding elbow had appeared at the vulva first. Immediately after this, if not supported, the child falls backwards again by its own weight, and rests on the anterior edge of the perineum; a kind of movement of restitution which again carries the left shoulder to the right, and the right one to the left side, soon takes place, and the bis-acromial again crosses the occipito-bregmatic diameter at right angles.

780. When fairly in the excavation, the head revolves on its occipito-mental diameter, so as to carry the face directly backwards, and the nape of the neck and occiput directly in front; the two extremes of the occipito-bregmatic diameter slide from right to left, and from before backwards, on the right posterior inclined plane, and from left to right and from behind forwards, on the

left anterior inclined plane, as in the first vertex position, so as to become parallel to the coccy-pubal diameter. The womb can now no longer act immediately upon the head, which is entirely or partly in the vagina, but the disposition to straining, produced by the pressure now experienced by the rectum and bladder, soon compels the woman to gather up all her powers and redouble her courage, and the contractions of the abdominal muscles soon come to the assistance of the powerless womb for whose forces they are now the substitutes. From this moment the occiput receives the whole weight of the expulsive power: in order that it may become parallel to the axis of the perineal strait, the occipito-mental diameter gradually executes a *see-saw* motion, which brings the anterior fontanel near to the anterior surface of the hollow of the sacrum, and causes the chin to thrust the breast towards the symphysis of the pubis. Finally, the nape of the neck, bearing upon the summit of the arch, as upon a fixed axis, permits the head to describe an arc of a circle, the radii of which seem to have the lower edge of the articulation for their centre, and to be composed of the occipito-mental, occipito-frontal, occipito-bregmatic, and vertical diameters; so that we see the chin, the forehead, and the anterior fontanel appear in regular succession at the vulva, after which the occiput escapes from above downwards, and emerges thus from the pelvis to put an end to the labour.

B. *Second Variety.*

Loins forward and to the right.

2d position of Baudelocque, Gardien, Capuron, Maygrier, Désormeaux and Dugès; 86 times in 234 feet presentations, Madame Boivin; 175 in 37,899 labours, Madame Lachapelle.

781. In the right calcaneo-acetabular position, the soles of the feet, the fore parts of the legs, and the whole anterior surface of the fœtus look towards the left and back part of the mother; the right side is towards the front and left of the mother.

The feet and legs as in the preceding position, are not mechanically stretched out, are not really pushed into the orifice, until after the perforation of the membranes. The hips, arms, and shoulders pass through the straits, and present themselves at the vulva in the same way; that is to say, diagonally at the superior strait, and antero-posteriorly at the inferior strait; but the act of rotation takes place from left to right instead of from right to left, as before: both the right hip and right shoulder, and not the corresponding parts of the left side, proceed to lodge in the arch of the pubis, the abdominal surface turns towards the left, and thus takes the situation of the posterior surface, which now looks towards the right iliac fossa; the occipito-mental and bi-parietal diameters, and the occipito-bregmatic diameter and circumference, preserve the same

relations with the axis, the oblique diameters and plane of the superior strait and with the coccy-pubal and bi-sciatic diameters of the inferior strait; but the face and forehead are obliged to descend along the front of the sacro-iliac symphysis, and the pivot motion occurs along the right anterior and left posterior inclined planes; in one word, the second position differs no more from the first than the left hand does from the right; and the mechanism of the one is so similar to that of the other, that it would be really fastidious to enter into any longer details concerning it.

C. *Third Variety.*

Loins directly in front.

3d position, Baudelocque, MM. Gardien, Maygrier, Capuron, Désormeaux, &c.; 7 in 254, Madame Boivin; 6 in 235, Madame Lachapelle.

782. It is true we find undoubted instances of the third position in Mauriceau, Smellie and Levret, &c.; but as these authors, as well as De La Motte, Deleury, and Asdrubali, did not distinguish them from the two preceding ones, we cannot ascertain in what proportion they met with them. Be this as it may, we do not perceive that the form of the strait can in any way prevent such a presentation from taking place; the pelvis is wide enough in front to admit of the two hips engaging in it transversely; the sacro-vertebral angle might very well lodge betwixt the thighs or legs of the child, whether flexed or extended, the belly and breast are too easily depressed to occasion the least difficulty in this respect; and the shoulders themselves would pass transversely through the strait as easily as the hips. As to the head, although in penetrating to the excavation it would not experience more, or might have even less difficulty, than if the vertex were presented in the third position, it notwithstanding rarely fails to deviate to the right or left side of the promontory. It is easy to see that in this respect there has been more dispute about words than things. In fact, if those accoucheurs who reject the third position of the feet, admit under that title only those cases where the middle line of the child's back glides along behind the symphysis pubis to the very close of labour, they are no doubt partly right, and such a labour must be extremely rare; but if, on the contrary, in order to constitute such a case, it suffices for the child to descend in this way until the arrival of the head only, we are not permitted to be ignorant not merely of its possibility, but also of its very great frequency.

During the progress of the labour, then, this third position almost always converts itself, a little sooner or later, into the first or second; sometimes it lasts only until the arrival of the hips at the superior strait; sometimes it maintains itself until the shoulders engage; sometimes it is not converted into a diagonal position until the breast has descended quite into the excavation; finally,

it may happen that it does not become converted at all, and then one of two things is observed to take place: either the hips, the shoulders, and the head do not turn upon their axes at the abdominal strait, in the excavation, nor at the inferior strait, and the child's back continues to look to the front of the mother both out of the pelvis and inside of it, and there is no pivot movement within the pelvis, nor restitution nor rotation outside of it; or, on the other hand, the hips and shoulders, which were engaged transversely at the upper strait, place themselves in an antero-posterior direction to pass through the vulva—in which case the head is the only part that does not turn on its axis.

2. *Calcaneo-Posterior Position.*

4th position of Baudelocque, MM. Gardien, Désormeaux, &c.; 10 in 538, Madame Lachapelle; 6 in 234, Madame Boivin.

783. Under the title of fourth position, Baudelocque comprised all the cases where the dorsal surface of the fœtus looks towards any point of the posterior half of the superior strait, and not merely those in which it is turned directly backwards, as we might be tempted to believe from reading a great number of modern works. In this respect he has only imitated Mauriceau, Dionis, De La Motte, Portal, Smellie, Asdrubali, &c.

In the usual folded state of the fœtus, the soles of the feet, the fore parts of the legs, and the forehead and abdominal surface of the child are directed forwards. The lower limbs being more or less rapidly extended and elongated by the uterine contractions, they pass through the vagina, and reach the vulva; the hips soon follow, and sometimes pass the superior strait in the direction of the bis-iliac diameter, more frequently in that of one of the oblique ones, or at least, after being slightly inclined, one forwards and the other backwards, provided they were previously quite transverse. When in the excavation, they are observed to engage in the perineal strait; sometimes parallel with the bis-sciatic line, at others by following the oblique diameter, and most frequently, after one of them has been placed behind the symphysis pubis, and the other in front of the sacrum.

784. The arms and shoulders present themselves in their turn, and act like the hips, with the exception only, that they more rarely fail to execute the pivot motion before they pass through the vulva, even though they had previously affected a transverse position; being repelled by the anterior edge of the perineum, these different parts, as they emerge, are raised upwards towards the mons veneris; to accommodate itself to the curve of the pelvis and genital parts, the fœtus bends in the shape of a very long arc of a circle, convex behind and concave before, as it does in an anterior position. The elbow that is below the pubis shows itself

first at the upper part of the vulva; but the opposite arm and shoulder, more particularly urged by the efforts of the womb, proceed from behind forwards along the posterior median line, and actually are the first to escape from the pelvis; the edge of the perineum immediately afterwards retires from the neck, as if to permit the trunk to fall back towards the anus, and the other shoulder to disengage from beneath the pubic symphysis; the back then turns back again, as by a sort of movement of restitution, which replaces the shoulders, the one to the left and the other to the right, or diagonally. The head cannot become engaged without being strongly flexed; on the one hand the occiput almost invariably deviates towards one of the sacro-iliac symphyses; on the other, the occipito-frontal diameter, or even the entire head, represents a lever of the first kind, whose anterior extremity more particularly supports the action of the expulsive powers; the chin, although more or less prevented by the breast, ends however by being depressed, and the occipito-mental diameter by finding itself almost parallel with the axis of the strait; the forehead and anterior fontanel come, one after the other, to hide behind the symphysis of the pubis, and thenceforth the occipito-bregmatic circumference is in correspondence with the plane of the pelvic margin, as in all the anterior positions.

785. When in the excavation, the head rolls on the inclined planes, replaces itself in an antero-posterior direction by means of the pivot motion, and afterwards glides with much more difficulty than when the occiput is forwards; the breast, which is situated in front, opposes the lowering of the chin; the occipito-bregmatic diameter, which is three and a half inches long, not being able to place itself in correspondence with the antero-posterior diameters of the excavation and apex of the pelvis, has its place occupied by the occipito-frontal diameter, which has an extent equal to at least four inches. The face, and particularly the forehead, are too broad and ill-disposed to fit the form of the pubic arch so exactly as the nape of the neck and the occiput do; finally, the shoulders hardly emerge before the chin presents itself at the vulva.

Nevertheless, immediately after the expulsion of the thorax and upper extremities, the upper and hinder part of the neck rolls from before backwards upon the anterior edge of the perineum, as upon an axis, and the nose, the forehead, the anterior fontanel and remainder of the head successfully disengage, by forcing the breast backwards.

786. *Remarks.* The mechanism of this position, as now seen, is very unfavourable, and much more difficult than that of the calcaneo-anterior positions; if the chin or forehead lodge upon the upper edge of the pubis, the act of flexion of the head is prevented or destroyed, and the occipito-mental diameter, or the occipito-frontal diameter and circumference, occupy the situation of the

occipito-bregmatic diameter and circumference ; then the labour cannot be terminated without assistance.

It would, notwithstanding, be wrong to conclude that art must of necessity aid the economy in all the posterior positions of the feet: attempts to change them would favour the reversion of the head, and most frequently produce just the state of things which it is desired most carefully to avoid. Besides, nature, when left to herself, generally succeeds better than any foreign power in flexing the head and placing it diagonally at the superior strait.* In a very great majority of cases this position spontaneously converts itself into an anterior position, either suddenly, after the head has got into the excavation, or, on the other hand, gradually, in proportion as the hips, the shoulders, and the head itself present.

787. In a case of this kind I have seen the hips emerge transversely from the vulva, turn in the direction of the oblique diameter that extends from behind and right to the left, then place itself in the antero-posterior direction, as the shoulders became engaged, then continue their rotation movement after the escape of the latter, and at last turn quite across, with the back in front, yet the head escape as in a direct anterior position. Now, this is what almost always happens if the accoucheur is skilful enough to do *nothing*, to content himself with sustaining the fœtus, as it passes the vulva, without employing the least traction.

788. If the loins are sometimes turned directly to the left or right, which cannot be doubted, inasmuch as Madame Lachapelle informs us that she had seen it so, we may be at least allowed to suppose that in this direction persons have been often deceived by the oblique position that approaches most nearly to it. But for this, the celebrated midwife would not have said that out of 1038 labours by the feet, there were found to be 347 left iliac positions, and 175 right iliac positions ; moreover, by the admission of Madame Lachapelle herself, the really lateral positions almost always convert themselves into anterior or posterior, diagonal or direct positions.

789. In all the feet positions, the hips and shoulders ordinarily execute a rotation movement, previously to engaging in the inferior strait ; according to Baudelocque, this movement may, however, possibly not take place, and the parts may therefore continue parallel to the bi-sciatic diameter ; according to most of the modern

* The best position for the woman, in this labour, is that on the left side, with the thighs strongly flexed. As soon as the shoulders are delivered, the body of the child should be turned back towards the woman's buttock, so as to give greater facility to the flexion of the head. At the same time that the child is pressed backwards, the edge of the perineum should be pushed towards the coccyx, in order to let the nape of the child's neck retreat as far as possible. When this can be done, a finger in the child's mouth will easily depress the chin, and thus effect the desired degree of flexion. I have succeeded in this way several times without any difficulty.—M.

accoucheurs, on the contrary, the hips and shoulders almost never pass the vulva otherwise than paralled with the coccy-pubal diameter. To reconcile these two extremes, there remained one intermediate opinion, and Madame Lachapelle embraced it, maintaining that the pelvis and upper part of the thorax pass through the inferior strait, in an oblique or diagonal direction, and not in a directly transverse nor antero-posterior direction, strictly so called. For my own part, if I can believe my own eyes, both parties are right; an error is found only in the exclusion by which each party endeavours to put down the other.

790. All the accoucheurs, both ancient and modern, have maintained, that in delivery by the feet, the arms rise along the sides of the neck and head. Wiedemann was one of the first to oppose this doctrine, and he pretends that they always remain applied against the breast, if no tractions of any kind are exercised upon the fœtus. M. Désormeaux and Madame Lachapelle adopted this opinion also. In the deliveries by the feet that have fallen under my notice, the forearms and elbows did not abandon the breast, and always escaped before the shoulders, when the woman was left to her own powers, and nothing more was done than to support, without pulling at the trunk until the expulsion of the head.

791. Though so many authors have professed the opposite opinion, which still prevails very generally, it depends solely on the circumstance, that the persons who assist lying-in women, rarely consent to remain inactive in a footling delivery; they lay hold on the members that spontaneously present, and the very natural, and in itself considered, laudable desire to put an end to the sufferings of the mother, causes them to pull with more or less force upon the child, and a phenomenon which is produced merely by art, is then very readily mistaken for a natural one. Where the womb, assisted by the muscular contractions of the abdomen, is alone charged with the duty of expelling the ovum, all the parts of the child are pushed down simultaneously, and so folded and pressed together, that it is very difficult for one of them to rise upwards while the others are descending; as the uterus does not contract from its fundus towards its cervix only, but also circularly, from above downwards, by a sort of vermicular or peristaltic movement, the elbows or arms run no risk of lodging against the upper edge of the pelvis.

792. If, on the contrary, the fœtus is *extracted* and not simply *expelled*, as the tractions come to act ultimately upon the breast and head, it follows, that these parts only are dragged downwards, while the arms, retained in their position by the womb, remain where they were, and can only descend in a direction extending from the shoulders towards their free extremities.

Nevertheless, I do not believe it right to deny, as Madame Lachapelle does, the possibility of the phenomenon admitted by

the older accoucheurs to take place in every spontaneous delivery. We may conceive that the arms, when once they have reached the excavation along with the shoulders, being no longer directly urged by the uterine efforts, may rise upwards by sliding along the sides and fore part of the breast, or rather, that the head, supporting from this moment, the whole action of the expulsive powers, may cause the face and breast to descend into the inferior strait, without necessarily carrying the elbows along with them. It must be so, further, since M. Gardien affirms that in many labours terminated by the feet without any assistance, he has seen the arms rise along the sides of the neck and head, and since M. Deneux told me he had observed the same thing.

Presentation of the knees.

4 in 20,517, Madame Boivin; 9 in 22,243, Madame Lachapelle.

793. The position of the knees being in all respects like that of the feet, it is useless to give the mechanism of it apart; in fact, whether the legs have descended, or remain bent upon the thighs, the lower extremities traverse the os uteri and straits of the pelvis with equal facility. Perhaps they descend with rather less facility in the second than in the first case mentioned, provided the membranes give way when the neck is still incompletely dilated; but the knees scarcely reach the vulva before the legs become extended, and thenceforth every thing proceeds as if it had been a footling case.

The knees present first, because they have been reversed, either mechanically or by muscular action, in the cul-de-sac formed by the apex of the ovum, at the moment when the membranes are ruptured, or because the rush of fluid forces them along with it, rather than the feet, which may be farther from the orifices; or because the breech, which, presented first, mounts upwards again along with the feet, under the influence of the contractions of the womb, so that the knees only can be depressed into the opening of the neck; or yet again, because, after the discharge of the waters, the legs are situated crosswise above the uterine orifice, or have been arrested against two opposite points of the strait. Moreover, we may conceive that they may both descend at once, or only one of them along with one foot, without that circumstance changing the progress of the labour; and it was entirely wrong to attribute more danger to delivery by the knees than to those that take place by the feet.

Presentation of the breech.

837 in 37,895, Madame Lachapelle; 375 in 20,517, Madame Boivin; 42 in 1800, Merriman; 36 in 1897, Bland; 126 in 6555, Boer.

794. Presentation of the breech has always been regarded as more dangerous, difficult and unnatural than that by the feet or knees. It was thought that the size of the buttocks would not admit of the expulsion of the child without the neck of the womb as well as the perineum being violently contused or extensively lacerated; but even had experience not pronounced upon the value of these exaggerated fears, a moment's reflection would have shown how unfounded they were. It is merely necessary to recollect the dimensions of the fœtal pelvis, to be instantly convinced that, even together with the thighs, the size of the breech could never form an insurmountable obstacle to delivery, unless there were some faulty conformation of the straits. When the child comes doubled, the pelvic extremity is too supple, too flexible, and accommodates itself too easily to the form of the openings it has to traverse, for it to expose the neck of the uterus and the perineum, any more than the head does, to the lacerations of which we have spoken.

795. In presentations of the feet or knees, the bag of waters is in general more elongated, tears more readily, and the os uteri has less need of being so largely dilated. With the breech, on the contrary, the amniotic sac is as large as in a head presentation, and does not open until it has produced a considerable dilatation; the buttocks and hips, which have to open a passage, react without inconvenience against the resistance of the neck; the belly and breast pass the straits and vulva without the risk of a very violent pressure; for excepting the head, the hips exceed, as to dimensions and firmness, any other part of the child.

796. In breech cases it is true that the labour, in general, goes on very slowly until they have passed through the cervix, and sometimes even until they have traversed the vulva; while in feet or knee presentations, it seems, at first, that the process of childbirth is going to be extremely prompt. But these differences are all in favour of breech positions; for in the second case, the phenomena then succeed each other, producing so much the less effect as the body is nearer being completely expelled; while in the first case, where the hips have once descended into the vagina, the rest of the body emerges with much less difficulty. I dwell upon this idea because it is well calculated to show how imprudent it may be, in a presentation of the pelvic extremity, to bring down the feet artificially, with the sole view of hindering the breech from engaging first before the dilatation is completely effected.

797. Baudelocque admits four positions for the breech, as he does for the feet, and divides them in the same manner; M. Flammant reckons eight of them, and MM. Maygrier and Capuron, four, as for the head, &c.

798. Without speaking of the cases where the fœtus engages squatting, having the heels glued, as it were, against the ischia,

cases in which art is almost always required for the assistance of nature, I must say that in women endowed with but little moral and muscular energy, the softness and flexibility of the breech will absorb the greater part of the motion communicated to the spine of the child by the womb, which often ends by falling into a state of inertia, and that the labour cannot then be always abandoned to itself without danger; besides, in the three anterior positions, the external organs of generation of the male sex are exposed to frictions more or less violent against the promontory; and it is also by no means rare to find black and confused echymoses in newborn children that come by the breech.

Whether the buttocks have passed the upper strait in a transverse or oblique direction; whether the back is in front or rear, it is not less a rare thing for them to fail to place themselves in an antero-posterior direction in the excavation; being strongly pressed against each other they swell; in boys, the scrotum becomes puffed and infiltrated; as they curve towards the pubis to gain the vulva, they distend the perineum almost as much as the head does, the form of which they partly simulate; they are next seen to disengage of themselves, and then every thing goes on as in a footling labour.

SECTION 3.

Of the Conduct of the Accoucheur during Labour.

799. When called to a woman who supposes herself to be in labour, there are two ways in which the accoucheur may behave, accordingly as he may have for a long time enjoyed her confidence, or as he may never have been much acquainted with her before.

In the former case he should examine at once, in order to ascertain whether the labour has really commenced; in the latter, it is often necessary to be not quite so much in a hurry, unless indeed the labour seems to be very far advanced.

He may begin to talk about one of the thousand subjects of futile conversation that every body understands, and which admits of only a gradual approach to the principal object; in this way time is allowed for quieting the agitation commonly occasioned in most women by the presence of a stranger, and particularly an accoucheur; during this parley, he should endeavour to possess himself of the shades of character, the caprices, tastes, and habits of the person he is called upon to direct, in order to adopt such a plan of conduct as is most likely to inspire her with great confidence in her attendant; the subject of her pregnancy is soon brought up, the symptoms that have accompanied it, the peculiarities that have marked it, and its term; he may ask whether

she has had several pregnancies, or whether this is the first ; he can ask about the general state of her health, the inconveniences and diseases that she has heretofore suffered, after which he may be allowed to think of the labour properly so called.

§ I. OF THE DIAGNOSIS.

800. Nothing is easier, in the opinion of bystanders, than to say whether a woman is in labour or not ; but this is not the case with the well-instructed physician. As women in their first childbirth lack a term of comparison, they very frequently deceive themselves in regard to the sensations they experience ; even in the second, third or fourth pregnancy women deceive themselves sometimes. How often have the neighbours, relations, the midwife or accoucheur been seen to fix and arrange every necessary preparation for the birth of the child, and the supposed labour cease for a whole month or six weeks, just when the bed had been made up for the reception of the woman, and when the clouts, the ligature for the cord, the scissors, the caps and other clothes of the child were only waiting for the arrival of the stranger to be applied to it ! How often have even still greater mistakes been committed ! Who does not know how poor women have been kept for days together on the child-bed, even by physicians, and at last found that their pregnancy was several months off from its close, or even that they were not pregnant at all ! A young woman in her ninth pregnancy was seized with pain, and thought herself at term ; several accoucheurs were called in succession. One said that the bag of waters was formed ; another, that the head was about to engage ; a third that he could not find the os uteri ; a fourth, that the forceps must be applied. This poor creature, in despair, sent for me on the fifteenth day ; I found the cervix as it is at the seventh month ; there was an anterior obliquity of the womb ; I stated that labour had not begun, and would not take place for more than a month—and applied a broad bandage round the abdomen. In a month, a student, who stayed by her, came to tell me that the os uteri was dilated, and delivery about to take place. I repaired to her, found no symptom of labour, and in fact, the child was not born till a month afterwards.

When persons who are strangers to the science of medicine are deceived in this way the public only laugh at them ; but what confidence can an accoucheur inspire who is guilty of such stupidity ? It imports us, therefore, to be on our guard against such causes of error, and it is easy for those who have any positive knowledge of tokology to do so.

801. The pains of labour, the *true pains*, are intermittent, separated by intervals more or less short, progressive, return at regular periods, are not accompanied with tenderness of the abdomen nor

heat of the skin nor fever; they begin in the neighbourhood of the umbilicus, and end in the pelvis or flanks.

Pains foreign to labour, false pains, are on the contrary, vague, irregular, sometimes more, sometimes less acute, do not entirely cease, increase under pressure, and are, most commonly, accompanied with fever or some kind of functional disturbance; they announce a lesion of the stomach, the bowels, the liver, the kidneys, the bladder or some other organ contained in the abdomen, and have been called false because they are entirely unconnected with parturition, appear in pregnant women as they do in those who are not pregnant, or as they do even in persons of the other sex. Nothing, therefore, but the greatest want of reflection, can cause them to be confounded with the true pains—those which depend upon the contractions of the womb.

802. I, however, ought not to omit speaking of a state that might render this discrimination very difficult, and a mistake at the same time highly dangerous: if an inflamed point be established in the neighbourhood of the womb, in that organ itself, in the bladder, rectum, &c., just as labour comes on, the pains of child-birth will progress just as those of the disease do, and if it were absolutely necessary to decide from the testimony of the pains alone, the most skilful person might be led into a mistake. But the science possesses other means of ascertaining the existence of labour. If, when the suffering is at the height, the hand, placed upon the hypogastrium, feels the womb grow hard, contract, and become rounder, it is decided that child-birth is about to take place, and, in this case, the true pains may exist alone, as they may also be met with in conjunction with false pains.* If the hand discovers the womb to be unmoved, without action, and without connection with the cries uttered by the patient, it may, to a certain extent, be affirmed that the labour has not begun.

803. In fine, we are by the touch enabled to solve the question without any fear of being deceived. While ever the cervix is still uneffaced, while it retains some few lines of length as a canal, we may, in general, assert that the woman is not at full term; only we must avoid mistaking the lips of the os tinæ for the cervix itself, and remember that in persons who have had several lyings-in before, it is now and then found to be extremely soft and very wide, several days or even several weeks previously to the end of pregnancy; and that in such women the orifice frequently forms a cushion or an edge several lines in thickness at the commence-

* Let not the inexperienced practitioner be led by this statement into the mistake of supposing that where the abdomen, in these pains, grows hard, and then relaxed, again to become hard upon the recurrence of pain, the labour is actually begun. M. V.'s remark is true as applied to the hardening or contraction of the womb itself; yet, in some cases of false pains, I have observed that they were connected with a spasmodic constriction of the abdominal muscles, which yielded to the touch a sensation closely resembling that of the womb under contraction.—M.

ment of labour. If it be a first labour, the cervix does not begin to gape antecedently to the appearance of the true pains, and if it feels like a tubercle, pierced through its centre, we may be satisfied that there have been as yet no uterine contractions; where, on the contrary, it is thin, like a sharp circle, the gestation is necessarily at its term, and if the parturition have not commenced, it is almost a matter of certainty that the labour will not fail to show itself within a few days.

To obtain a decisive proof on this point, we have, at most, only to touch during a pain; if the finger feels, in such a way as to admit of no doubt, that the membranes become tense, that they try to engage in the os uteri, which manifestly becomes thinner, contracts, or opens a little, to return immediately afterwards to its primitive condition, nothing further is wanting, the labour has begun; if nothing of all this is observed, we may be content, the moment for lying-in has not arrived.

804. However, I cannot quit this article without calling the attention of young practitioners to a peculiarity in the diagnosis that is not sufficiently known, and which might lead them to deceive themselves, after what has been above said. Modern accoucheurs have with one accord rejected, as among apocryphal or ill-understood facts, the very numerous cases tending to prove that labour may begin, the contractions of the womb be brought into evident play, and that, after having continued for several hours, the labour may be suspended so that delivery shall not take place for a whole month afterwards: such anomalies as these have been cited chiefly on occasions of protracted gestation, and as proofs of superfœtation; it has been pretended that such powerless efforts as the above had masked the natural term of gestation, and that the time that elapsed betwixt their cessation, and the real labour, was an excess over nine months. But I have acquired the conviction that this incomplete labour, or, as Levret calls it, *false labour*, is not a mere chimera. In March, 1824, I was called to a woman in the Rue d'Orleans, in her second pregnancy, and who had been in pain for about twenty-four hours; the pains were regular, weak, and separated by pretty long intervals; the os uteri, which was very soft, and wide enough to admit the introduction of three fingers, was not completely effaced; the point of the ovum had already begun to engage within it, and when the pains came on, the membranes were on a level with the top of the vagina, and became smooth and tense, while, on the other hand, I felt the orifice and body of the womb harden and contract with a certain degree of energy. It was ten o'clock at night; I announced that the labour would not terminate for several hours. I returned home after giving orders to send for me as soon as the waters should break; not being sent for the next day, nor the day after, I supposed they had had recourse to the advice of some other practi-

tioner, and thought no more of it. Six weeks afterwards, being called upon again, I confess I was surprised, for I supposed the woman had been delivered long before. This time the symptoms persisted, and delivery took place. M. Nivert has published, in the *Clinique des Hopitaux*, a case of the same kind which he met with at my amphitheatre. MM. Gerdy and Tanchou assure me that they have witnessed cases nearly similar, and I have myself since met with two others.

§ II. TO DETERMINE THE POSITION.

When the existence of labour is no longer doubtful, we must endeavour to learn in what position the fœtus presents.

805. The vertex is in general easily known by its round and regular shape, by the posterior fontanel, and occipital point, by the anterior fontanel; the sagittal, transverse, and lambdoidal sutures, and by the parietal protuberances; however, when the head has been for a long time engaged, the teguments occasionally form so large a tumour upon its summit, it is itself sometimes so elongated, that one has need of some practice in order not to mistake it. It is in many cases so movable, and particularly so high up, as to render it difficult to distinguish it with certainty from any other part. As long as the membranes remain unbroken, we ought, besides, not to try to reach it except in the absence of the pains; otherwise we should be liable to rupture them prematurely. We can, therefore, best judge of the presentation of the fœtus, at the moment when the waters come off; the upper oval of the head may then be touched throughout its whole extent; the integuments are not yet swelled, and the bones have not had time to ride over each other. In the three varieties of the occipito-anterior position, the posterior fontanel approaches more or less near to the pubal semi-circumference of the pelvis, and is behind one of the acetabula or the symphysis pubis, while the frontal fontanel is more or less elevated behind, and looks towards the opposite point of the pelvic cavity; in the varieties of the posterior position the fontanels are disposed of in the inverse directions. Although it approaches very near the centre of the straits, the posterior fontanel, notwithstanding, almost never corresponds to it exactly; both in the anterior and posterior positions, this fontanel is always placed upon a much lower plane than that occupied by the anterior fontanel. In order more correctly to distinguish the different varieties of the vertex, we should endeavour to recognize the sutures; by adding their direction to the notions we derive from the particular situation of the fontanels, it is commonly easy to avoid confounding the anterior with the posterior varieties, and to attach to each shade of one and the same position, those characters by which it is separated from all the others.

806. The *face* is so different from every other part, that, at a

first glance, it seems impossible to mistake such a presentation: this is an error; the proof of the contrary is contained in all the collections of cases, and is daily met with in practice; the chin may be mistaken for the elbow, the shoulder for the heel, or the knee; the mouth for the anus, the nose for the sexual organs, and the cheeks for the tuberosities of the ischia. Lest the testimony of an infinite number of learned observers should not suffice to demonstrate the possibility of such mistakes, I will relate a well-known anecdote of a former professor of midwifery at the *Ecole de Paris*: being a man of a rather decided character, he had just touched a woman in labour, and supposing he had found a face presentation, he asserted with great gesticulation that such a position could in no case be confounded with one of the breech, not perceiving that his finger, which was covered with meconium, was giving him the lie, in the faces of the students, who could not help bursting into loud laughter.

It is chiefly in cases where the soft parts of the face have had time to swell and puff up, that we may be readily deceived, especially when the mind, preoccupied with such or such a position, receives, with a sort of avidity, the most equivocal signs as certain proof of what we had predicted. With proper attention, however, we shall be enabled, without difficulty, except in a few very rare cases, to recognize the face whenever it presents, and the rupture of the membranes allows us to examine it naked; the eyes and eyelids, the nose and lips, the alveolar arches and tongue, the chin and ears, which are found near at hand, possess characters too decided for the positions of the face not to be always clearly ascertained.

807. The *feet* cannot deceive the accoucheur when they present: the heel, to be sure, has some resemblance to the elbow, and the toes some similarity to the fingers: but when we remember the difference of length between the latter named parts—that the one are arranged upon the same line and short, that the others are of unequal lengths and much flexed; when we reflect on the form of the ankles and legs, one must be very careless to compare it with the fist and forearm, and not to distinguish the feet from the hands, excepting when these parts are still above the superior strait.

808. The knees might indeed be mistaken for the elbows or shoulders, although rounder than the former and smaller than the latter. But as two elbows cannot, any more than two shoulders, present at once at the strait, we may be sure that they are the knees, from the mere fact that there are two such tumours together in the strait at the same time; and as a single knee is generally accompanied with one foot, or at least with the breech, it will always be easy to satisfy ourselves that we are touching some part of a lower extremity, and not one of the arms. There is, not-

withstanding, one circumstance that seems as if it might impose upon us; I mean the simultaneous presence of a knee and an elbow. But besides the rarity of these coincidences, we learn, by penetrating a little further with the finger, that these parts, instead of approaching towards each other at their origins, separate farther and farther from each other.

809. Presentations of the breech have, more frequently than others, led into error on this subject; where the buttocks have had some difficulty in getting through the os uteri on the strait, they swell like the vertex; the crease that separates them may be mistaken for the sagittal suture; the coccyx and space in front or on the side of it, for the occipital angle, the posterior fontanel, and lambdoidal suture; and lastly, the ischia may be mistaken for the parietal protuberances; but this same crease, being a slit and not a fold, the movableness of the coccyx, the presence of the anus and of the genital parts, the roots of the members, &c., soon bring the accoucheur back to the knowledge of the truth, when he has departed from it for an instant. The anus and genital parts might be mistaken for a face presentation, were we not to remark that the mouth, bordered with thick lips, contains a conoidal, movable, and fleshy body, the tongue, and that the finger, when withdrawn from the rectum, is found to be covered with meconium. Still, another circumstance might deceive us. I shall give the particulars, because the authors have omitted to mention them. Having been called upon by Madame Lebrun, the midwife, to terminate a preternatural labour, I thought I could feel the feet, the buttocks, the coccyx, and anus; but my finger penetrated into an opening, bordered by thick lips, at the bottom of which I felt a tubercle similar to the tongue. Disconcerted by this combination of signs, I for a moment thought I had to deal with a monstrous child; I again introduced my hand further; I brought down the feet, and the emergence of the hips soon put an end to my uncertainty. It was the vagina that I had mistaken for the mouth, and the cervix uteri, which is very salient at that age, had made me suppose I felt the tongue. In order to obviate all hesitation in such a case, it is merely requisite to remember that the mouth is open behind, so as to be continuous with the pharynx; whereas the vagina ends in a cul-de-sac, at the bottom of which the os tinæ is to be found, in the shape of a tubercle, more rounded, shorter, and particularly, less movable than the tongue.

§ III. OF THE PROGNOSIS.

810. After having established the diagnosis, a new question naturally presents itself to the mind of the accoucheur, while it is very soon propounded to him also by the patient herself or her attendants. Will the delivery be prompt and easy, or slow and

difficult? When will it take place? The answer here is an extremely delicate matter, and ought only to be given after maturely weighing it, and then, with the greatest reserve. The duration of labour is so variable, depends upon circumstances so diverse, and sometimes so unexpected, that it is often impossible for the most skilful practitioner to fix it beforehand, even approximatively. On the one hand, it would be necessary from the very beginning to know the proportions of the fœtus and pœlvis, with how much energy the womb shall contract, and how often the pains shall succeed each other; on the other, he ought to be able to affirm that the progress of the labour shall or shall not be interfered with by a hemorrhage, an attack of convulsions, a prolapsion of the cord, or some other accident; that the fairest and best position shall not be converted to an abnormal one; that the membranes shall give way at such a particular period, and not at any other; that there shall or shall not occur a spasmodic resistance of the cervix, &c. Now, none but ignorant women or impudent quacks can pronounce upon all these points, and, in spite of so many uncertainties, say at what hour the labour is to terminate.

811. All that we are permitted to promise in a general way is the following: the child is well situated; the pelvis is neither small nor deformed; the genital organs are healthy and well disposed; the os uteri soft and very dilatable; the pains occur regularly and with constantly increasing force; the woman is courageous and well constituted; therefore the termination of the labour will be prompt and fortunate; a little less prompt if it be a first labour; a little more so if she have had several children before, and still more so, even too rapid, if the pelvis be possessed of excessive amplitude. On the other hand, the position of the fœtus, without being positively bad, is not, however, one of the best, or perhaps it may be a very large one; the pelvis is slightly contracted; its axes are too much or not sufficiently inclined; the os uteri is hard, or covered with cicatrices; the woman is of a delicate, nervous, or lymphatic constitution; in all these, we ought to fear that the labour may become a long one, and that the resources of art may become necessary. We can also, to a certain extent, judge of the duration of the present labour by her former ones, and particularly by the effect produced by each pain upon the dilatation of the os uteri, and upon the progress of the fœtus through the pelvis. In fine, when all the phenomena occur in their most common order, we may, by calculating the time that has elapsed since the first pains, tell, within a few hours, how long the woman has still to suffer. If, for example, only two or three hours were required to bring the dilatation of the os uteri to the size of a five franc piece, it is extremely probable that not more than that will be necessary to complete the expulsion of the child; but this is the highest degree of precision to which we can pretend,

and those who pique themselves upon the possession of more exact knowledge in this matter, either impose on the public or deceive themselves.

812. The accoucheur who, for the purpose of making a parade of vain knowledge, thinks himself able to announce the precise term of delivery, not only exhibits his own ignorance or bad faith, but he also compromises the dignity of his profession and the safety of the woman. If, indeed, it be true that chance is often on the side of impudence and quackery, it often happens that the predictions of ignorance or rash vanity are not realized; but if promises, generally made with much emphasis and assurance, are not fulfilled at the appointed time, that alone is enough to give rise to the liveliest solicitude, in the minds of relations or assistants, and especially in the patient herself, who never fails, afterwards, to think either that her destruction is certain, or that she is to have a bad labour.

§ IV. OF THE ATTENTIONS NECESSARY FOR A WOMAN IN LABOUR.

813. Inasmuch as spontaneous parturition is a natural function and not a disease, are we thence to conclude that the art of the accoucheur is unnecessary, and that women in labour have no need of assistance? Some physicians, misled by mistaken philanthropy, have thought so. In animals, say they, pregnancy brings no inconveniences, and delivery is almost unattended with pain. The wives of the Ostiacks, who are still strangers to the refinements of European civilization, are delivered of their children upon the spot where they happen to be, and immediately resume their accustomed occupations, or continue their march, if they happen to be on a journey. Those of the island of Amboyna, who live under a directly opposite temperature, behave in the same way. The aborigines of certain countries in America bathe themselves in cold water and return to their work as soon as the child is born, while the husband goes to bed and plays the patient for a week or two! Parturition is a mere nothing to country women, who cannot spare time to drag themselves, methodically, from the bed to the sofa, and *vice versa*. Who has not seen soldiers' wives bring the most robust and finest children into the world, without in any respect deviating from their active modes of living, or without ceasing by forced marches to follow their regiments? Even in the large cities it is not uncommon for poor women to go on foot to a midwife while the pains are upon them, and return home the next day in spite of Hygiene, their poverty not allowing them to attend to themselves for more than three or four days. I, like Roussel, have seen a young girl who found means to conceal from her parents both the humiliating proofs of her weakness and the operation that delivered her from it. What

practitioner is there who has not had an opportunity of making the same observation? The pregnancies of these poor creatures being illegitimate, it would seem as if they had no right to be sick. But these remarks in no wise prove that women ought to be left to themselves during parturition. In the first place it is false to say that parturition in animals never requires any assistance, and is never accompanied with serious accidents: sows, mares, cows, &c., are even, in general, quite ill in bringing forth their young, and country people are by no means ignorant of the fact. Does it follow, because some women, when compelled by imperious motives to deliver themselves in private, or without taking the least precaution, escape from the serious dangers with which they supposed themselves to be threatened, that all others may imitate them without exposure to more imminent perils? If there are some whose health is not disturbed by such painful experiments, how many others are there who become the victims of their temerity? Because one man falls from the top of a roof without breaking his bones, does it follow that we should advise others to go to the house top to have the pleasure of tumbling down to the ground? Will people never be tired of referring us back to a period of primitive nature, that every body talks about, and that nobody understands? By attempting to substitute the exception for the rule, we inevitably fall into absurdity, and that is what happened to the elegant Roussel. If, in order to avoid the dangers of abuse, it were always necessary to forego the use, what would become of the human race? The business of the accoucheur, doubtless, is not to put himself in nature's place where a labour is natural; but somebody ought to be with the woman who is able to give her proper directions, to foresee accidents, to recognize them, and to remedy them when they do take place; to apply the resources of art when necessary, and at the opportune moment; who, by the confidence he inspires, calms all her fears, and gives courage and resignation, by tranquilizing her in regard to the future; but who differs more and more from the mere spectator, in proportion to the extent of his knowledge and skill.

814. *Hygienic treatment.* The chamber and every thing connected with it should be first attended to. In great cities a back room should be preferred, or the quietest and best-aired apartment of the establishment. It is important that this chamber should be sufficiently spacious, well lighted, and so constructed that its temperature may be easily altered. Too great a degree of heat would promote sweats, cerebral congestions, convulsions, nausea, and vomitings, to which women are already but too much predisposed during the efforts of labour; cold would not be less injurious, both by the disagreeable sensations it would be sure to excite, and especially by hindering the expansive movements of the fluids.

815. *Odours*, even the sweetest, are also not without inconveniences. During labour the nervous irritability of the women is generally of the highest grade, and the senses become excessively excitable. The most valuable perfumes are sometimes borne no better than the most disagreeable odours. It would not, for example, be always safe to place a woman in labour in an apartment filled with the emanations of musk, amber, lilies, orange flowers, or roses. I have seen a lady fall down insensible and with convulsions, upon entering a room containing a pot of reseda. I am acquainted with another who, without being pregnant, is seized with syncope or lypothymia whenever a fresh rose is brought near her.

816. The *regimen* of the patient requires the most careful superintendence of the accoucheur; indiscretions in respect to it may give rise to the worst consequences. In regard to this point, attention must be paid to the probable duration of her sufferings, to her constitution, and habits: if the delivery may be expected to take place within from four to six hours at farthest, all kinds of aliment are hurtful, by loading the stomach, whose digestive power is temporarily suspended. If, on the contrary, the labour progresses slowly, she may have broths or some light kind of pottage; but she ought to refuse coffee and chocolate, usually preferred by women in large cities, as well as bread, fruits, vegetables, and meats of every description, which are best liked by country people; coffee has too much influence upon the innervation and circulation, and chocolate, bread, and meats are too difficult of digestion to be given without some fear in these circumstances. All this, however, ought to be understood only in a general way; a woman who is healthy, but rather feeble than strong, whose digestive organs are in a good condition, may without inconvenience, and sometimes even with advantage, take a breakfast of coffee or chocolate, at the commencement of her labour, especially if she has been long in the habit of using them, just as we see stout, vigorous country women, as well as robust women of the labouring classes, eat one or several cutlets without being at all incommoded by them. It ought to be known that these exceptions are numerous, for by proscribing food in all cases indiscriminately, we just favour the evil we wish to avoid; no matter how absolute the threats of the accoucheur, it is not uncommon for them to be disregarded, and if no bad consequences follow, the woman, emboldened by impunity, no longer submits to advice, relates her story to her acquaintances, and as all beings are not less alike in their liability to illness than in shape, the punishment of her indocility fails not to fall upon some of those who have had the imprudence to listen to her. I was called to a woman in her first confinement, in the month of March, 1824: this lady's mother had had thirteen children; she had never omitted to drink a bottle

of wine and eat one or two cutlets during or immediately after her travail; in spite of my remonstrances the daughter must follow her example, but the unfortunate lady expiated her mother's imprudences with her own life! We must therefore allow to some what we would rigorously refuse to allow to the far greater number, and content us with laying before the most obstinate the dangerous risk they run, and then leave them at liberty to do as they like.

817. *Drinks.* Where the duration of a labour does not extend beyond the most ordinary limits, the woman herself is pretty often the first to perceive that she ought not to eat, that food would do her harm. This is not the case as to drinks; the excess of heat observed during the strong pains has the effect of drying the organism, and loudly demands the introduction of fluids into the interior. Those that may be allowed are innumerable; the infusions of mallows flowers, of marshmallow roots, of linden, of violet, of bugloss, and borragé; decoctions of barley, of dandelion, liquorice, &c., either pure or edulcorated with syrup of sugar, gum of honey, capillaire, cherries, or marshmallows, may be given almost without distinction, as well as all imaginable ptisans, provided they do not exert any evident action upon the organism, and are not acid; for it is the water and not the medicaments that is here demanded by the organs. Lemonade and acidulated drinks would suit as well or even better than any other; but the stomach does not bear them well because they increase its tendency to acidity. Wine and water produce the same effect; the other ptisans often diminish the thirst very little, particularly if the woman does not like the decoctions of barley, dandelion and liquorice, which are more refreshing, though they happen not to suit or be agreeable to her taste; if pure cool water is taken with more pleasure and satisfaction, I see no reason why it should be refused to her, taking care always to correct its crudity with a few drops of orange-flower water, or syrup of cherries in very small quantity. In the country, and among the lower classes, where the disembodied relics of old medical doctrines ordinarily take refuge, hot wine and *roties-au vin sucré* are still given, with the view of sustaining her strength, and *eau de carmes*, and a hundred other more or less heating compositions to accelerate the labour whenever it appears somewhat tedious; but these incendiary measures, which inflame the already irritated organs, disturb all the functions, and sometimes excite fever that no means are capable of allaying, and produce a dreadful hemorrhage much more commonly than they do any good in hastening the delivery, begin to go out of fashion, and, let us at least hope, will before long cease to enjoy any favour. Madame Malville, a skilful and prudent midwife, was on the night between the 20th and 21st of January, 1828, called to a poor woman, and though all the phenomena succeeded each other with the greatest regularity, all she could do was insufficient to prevent

the administration of hot wine ; a hemorrhage came on ; new doses of wine were taken ; the blood flowed still faster, and wine was again given to obviate the faintness ; the child nevertheless was expelled, but a frightful discharge took place immediately afterwards, and but for the coolness and firmness of the midwife, the poor creature, pale and exhausted, and unable to turn her head upon the pillow without falling into syncope, must have inevitably lost her life.

It is only in cases of weakness or languor, depending upon old diseases, or the peculiar constitution of the woman, that it is occasionally found useful to give a few spoonfuls of good red or white wine ; but there must be no counter-indication, arising from the state of the digestive organs, nor a state of excessive nervous excitability.

818. The state of the alvine and urinary excretions will also require the attention of the practitioner. The constipation, which is so common during pregnancy, causes the rectum to remain inactive at the approaches of labour ; its contents may prevent the head from gliding downwards, irritate the sphincter and mucous membrane in the neighbourhood of the anus, occasion too violent a straining, and promote the formation of hemorrhoids, which are naturally of too common occurrence in parturition. Consequently, provided the woman does not feel the necessity of going to the close stool, an injection of a decoction of marshmallow root or flaxseed, or simple tepid water, should be given.

819. Provided no discharge of urine takes place before the head becomes engaged in the superior strait, the emission becomes more and more difficult, in consequence of the compression which the bas-fond of the bladder soon suffers ; it may therefore be supposed that if the delivery is protracted, the retention of the urine may be followed by a painful distension of the bladder, and that the woman, who is restrained by the fear of increasing her pain, will cease to bear down, except very moderately. The action of the abdominal muscles, as it can then be transmitted to the womb only through a stratum of fluid, ceases to be so efficacious, or if the woman gives herself up without reserve to the whole force of the exertions she is capable of making, there may be reason to fear a rupture of the bladder, a terrible accident, which is almost necessarily mortal.

The woman should therefore be advised to evacuate the bladder while she is still able to do so, and if the natural efforts are insufficient to effect the object, the catheter should be employed for that purpose. We are in such cases sometimes obliged in consequence of the shortness and slight curve of the female catheter, to make use of a male one ; but if we take care to push the fundus of the womb backwards with one hand, whilst we try to introduce the instrument with the other, I do not think that the flat

catheter which is recommended by some of the English physicians, can ever be indispensably necessary.

820. The period of labour is, without contradiction, one in which the *moral state* of women demands the greatest attention ; consequently, we ought with all possible care to abstract whatever may be disagreeable to them, or likely to vex them, and to respect even their caprices and the oddities of their characters.

None should be permitted to remain in the room except those persons who are indispensably necessary ; that is, one, or at most, two friends, the nurse, and accoucheur. More than these would render the air impure ; some could not bear the spectacle of suffering without reflecting the impress of it from their countenances ; others could not keep their tongues still, would always have a supply of stories of dreadful cases, and a thousand imprudent things to say ; at one while, that Mrs. such-a-one was delivered of a monster, or neighbour such-a-one died with convulsions ; at another, they delivered Mrs. so-and-so with *instruments*, &c. ; from tenderness or real interest or affectation, they grow quite sad, and lament over the possible consequences of the lying-in ; and whisper or talk in a low tone, or at least they sit gloomy and silent, and merely throw a furtive glance of pity towards the woman in labour, who, as she is almost always disposed to make an evil interpretation of all that is said and done about her, every moment looks for her sentence of death in remarks only half heard, in gestures, or in the expression of sadness and compassion she observes in her attendants.

821. Parturition is a function that seeks the shade, that may be obstructed by indiscreet looks, and which as far as possible is made a mystery of by modest women. The accoucheur ought to understand that the mother, the aunt, grandmother or sister, are not always considered as the most agreeable attendants in this painful moment. As a discreet as well as a circumspect and prudent interpreter, he ought to dismiss without distinction every one whose presence is not desired by the woman. How careful should he be himself ! impassible and firm, of an imperturbable coolness, he must, notwithstanding, know how to compassionate the distress of which he is a witness, encourage, console, amuse ; inspire her with boundless confidence, and great familiarity, by the affability of his conduct, by reasoning that every body can understand, by his patience, the amenity of his temper and the gravity of his manners ; he should be able to procure obedience without constraint, and by all the means which are suggested by moral philosophy, his own understanding and education, incessantly combat the discouragement and dread of all sorts, and the sadness and alarms to which the most resolute as well as the most timid women sometimes give way.

822. The dress of a woman in labour was formerly a matter of

great consequence; there were gowns, jackets and head-dresses devoted to this purpose alone; every country, each province, and even each family, had its peculiar fashion; a woman of good family would think she could not lie-in decently without her gown and other lying-in clothes; at present these old customs are no longer to be found, except in a few countries or families, where, out of a mistaken feeling of respect, people obstinately resolve not to live differently from the mode adopted by their ancestors. To this the accoucheur has nothing to say, provided the form of the dress and its arrangement are not of a nature to interfere with the free exercise of any of the functions, provided there be no constriction of the abdomen, the breast or the neck, that the motions of the limbs are left free, that the materials are light, neither too hot nor cold, and that the circulation does not suffer from their employment.

823. The *bed for child-birth*, which is also called *lying-in bed*, *bed of labour*, *bed of pain*, *bed of misery*, *little bed*, &c., is also a matter of fashion or custom, which has singularly varied as to its form, according to times, places and whims. There are some women who will not make use of them, and who are delivered standing up, the elbows resting on a mantel piece, the back of a chair, a table, a bureau, or some other piece of furniture, or even leaning on the shoulder of some friend. Some women place themselves on their knees upon the floor; other place themselves on their husband's knees, with their legs much bent and elevated. The ancients made use of a peculiar kind of seat or elbow chair, a *lying-in chair*, having supports for the arms, a movable back-piece, with notches in a piece to keep it at different degrees of elevation, a support for the feet, and a pierced seat; so as to be converted at will, either into a real bed, or an arm-chair. These chairs, still made use of in Germany and Switzerland, and very good drawings of which may be seen in the works of Stein and M. Hermann, are no longer employed in France, notwithstanding M. Rouget has lately attempted to revive them by presenting to the Academy, and to the administration of the hospitals of Paris, a new lying-in bed of his own invention. They are not wholly destitute of advantages, but as they can without inconvenience be replaced anywhere by other means more common, and always at hand, no person feels the necessity of resorting to them; and it would be too ridiculous to see a surgeon, as in former times, always followed by his lying-in bed, when proceeding to visit a woman in labour.

824. The best bed is one with a sacking-bottom, tight, of a middling size, and so placed that the upper end may rest against one of the walls of the chamber, and leave room to pass conveniently all round the rest of the bed; one mattress is laid on this sacking-bottom, and a second one, bent double in the middle, is

arranged upon it in such a way that the edge of one of its extremities may support the buttocks, while its folded portions supports the back and head; a piece of cloth, some oil cloth or some cushions, pillows and bolsters, to supply an inclined plane for the head and breast, complete the preparations.

We may also be content with a cushion, to be slid under the middle of the first mattress, so as to raise the pelvis up and leave the perineum naked; the head of the bed is then formed with one or two common chairs, turned downwards, with the legs against the wall, and the upper edge of their backs towards the woman's breech; the rest of the arrangement is completed as before, and the second mattress is not wanted.

A single mattress, without any cushion, will also answer; it is to be doubled; the head of it is to be raised with chairs; all that portion of the sacking-bottom that is to be in front of the pelvis is left uncovered, and by means of some cloths to receive the discharges upon, we may avoid soiling any part of the bed clothes. Some persons add a stick, fixed cross-wise to rest the feet against during the expulsive pains; but this fixture is more troublesome than useful; the hands of an experienced nurse answer much better, for they can follow the different degree of flexion and extension of the limbs. In the country, a bed is often made by placing six or eight chairs face to face and laying a mattress upon them.

Indeed, a strong and well-formed woman may be delivered in any posture, on a chair, on the floor, a bundle of straw, on foot, and on all the kinds of beds that have been proposed; so that it is only in the cases where nothing interferes with the accoucheur's prescribing just what he thinks best, that he ought to attach some value to the composition of the lying-in bed; further, the only essential matter is, that the woman should be as comfortable as possible, that she be not incommoded, neither during the pains nor the intervals between them, and that the perineum may have room to dilate.

825. There is not, neither can there be any fixed period at which all women should place themselves on the lying-in bed: some women feel the necessity of going to bed as soon as their pains get to be pretty strong; others not until a much later period, and most women may be guided in this matter by what agrees best with their own particular feelings; as long as they keep on the bed, or on foot either, because they are more comfortable in either case respectively, and not for the sake of gratifying some preconceived notion, they ought to be indulged; it would be absurd to compel them to remain on the bed from the beginning to the end of a labour, while the only means of alleviating their distress consists in moving about from place to place: on the other hand, by compelling them to keep up till the close of the labour, their courage and strength are exhausted to no purpose; they are

exposed to the danger of bringing on flooding, to the prolapsion, and overturning of the womb, laceration of the perineum, and to the too prompt and precipitate escape of the fœtus.

Therefore, in regular labours, where there is no special indication to be fulfilled, it is useless for the woman to lie down previously to the rupture of the membranes, unless it be for the purpose of resting when she feels fatigued. When, on the contrary, the dilatation of the os uteri is complete, and especially when the head has descended into the excavation, it is better, but not always indispensably necessary, for her to lie down on the bed in readiness for it. Where the pains are weak and far apart, and where the membranes give way early, or the head remains very high above the superior strait, and the os uteri, although soft and very dilatable, opens with difficulty, she ought to keep up and move about as long as her strength will permit. Again, she should be persuaded to lie down early if her pelvis be a very large one, and the membranes do not give way, though the os uteri be dilated, when the labour progresses too rapidly, and when there is a threatening prospect of hemorrhage, or when there is an obliquity of the womb. Women affected with curvature of the spine, asthma, hydrothorax, ascites, or some other abnormal disposition, are sometimes constrained not to lie down at all, and are obliged to be delivered while standing up, or seated, or on their knees, &c., while there are others who could not leave their beds before the termination of the labour without difficulty. But these are cases of exceptions which do not belong to the class of eutocia.

826. When the woman is on the bed, she should, during the pains, be on her back with the legs and thighs half flexed, and the feet resting on the mattress or sacking. This posture, which is so natural that women assume it of their own accord, and if they have changed it for a moment, always return to it as soon as the pain returns, is particularly necessary where the womb is strongly inclined forwards. But in the intervals of the contractions it would be as ridiculous as it would be cruel to exact any determinate attitude; the women ought then to be left free to choose a position that is most agreeable to herself, on either side; a being, when suffering unavoidable pain, at least hopes by changing its situation and trying various positions, for some alleviation of its distress; to deprive it of such a resource, would be a real act of barbarity. Moreover, the attitude on the back is very rarely necessary except in cases of very decided obliquity. Most of the English and American women lie on the left side, with the breech near the right edge of their common bed, which is properly prepared, the legs and thighs flexed, the knees separated by pillows or cushions, and notwithstanding, we do not find that child-birth is much more dangerous in England than in France. However, it is evident that such an attitude must be very uncomfortable and

unfavourable to the muscular contractions that occur during the pains. The British accoucheurs who recommend it, think it admits of their supporting the perineum more effectually, of employing the touch more freely, and, which I cannot understand, of operating more readily with the forceps, the hand, or any instrument whatever; but when we remember to what extent the modesty of the English ladies is carried, and reflect on their extreme delicacy, and the reserved character of their manners and customs, we are rather led to think that the lateral position, which prevents them from looking the accoucheur in the face, has been chosen to gratify and save them from unpleasant feelings.

827. The accoucheur places himself to the right of the bed; he is there most commodiously situated to touch, to follow the progress of the labour, and support the perineum: all of which may be done under the bed clothes, for it is with the finger or hand, and not with the eye, that he must here act and ascertain the state of the parts. As the will and the courage of the patient exert a great influence on the progress of parturition, it imports him to know how to direct their powers. We daily meet, in practice, with women who *bear down*, and endeavour to make the most of their pains as soon as they become somewhat strong; the old woman, the midwife, and sometimes the accoucheur himself encourage them to act in this way, by persuading them that they will be the sooner delivered. Such conduct is extremely blamable, and can only be the fruit of ignorance or want of reflection. Where the os uteri is not dilated, the membranes unbroken, or at least where the head is not as yet engaged in the superior strait, efforts to hasten the delivery only serve to exhaust the woman to no purpose whatever; until the end of the first stage, the action of the muscles is not solicited, the womb does not demand their aid, and they can be of no use.

But as soon as the fœtus penetrates into the excavation, the os uteri being dilated, and the membranes ruptured, and the sense of weight about the *fundament*, tenesmus, and strainings are felt, they occasion a desire to *bear down*, and compel the muscular contractions to come on stronger and stronger in aid of the womb, in proportion as the child is nearer the moment of expulsion. The womb now compels the efforts to take place, independently of the woman's will; the thing is, to know how to make the best use of them, and there are many women who do not know how to do it—who do not know how to deliver themselves; who, with the expense of a considerable degree of power, cause the labour to advance but very little; the accoucheur should teach them their apprenticeship, if I may use such an expression, should teach them that when the pains are regular, they should not employ their voluntary efforts until the contraction is fairly begun, or until the muscular action is positively solicited; then by pressing the

pelvis, feet, and hands upon the bed or upon the persons stationed to support them, they should bear down with all their might, as if at the stool; as soon as the womb itself ceases to act, all effort ought to be suspended, and the woman should be strictly directed to rest, and be as still as possible, never losing sight of the fact, that the muscles are not intended to force the fetus downwards, but only to aid and support the contractions of the uterus.

828. The pains are sometimes so acute, so intolerable, when the head reaches the inferior strait, that instead of bearing strongly on the pelvis, and pushing downwards, the woman, in spite of herself, draws it upwards as if to avoid the pain. In this she is doubly disappointed; in the first place, because nothing can save her from the distress she endures, and because she in this way voluntarily protracts the period of her deliverance; and then, far from being an evil, violent contractions are what she should above all things desire, for upon them depends the prompt termination of the labour. The same thing often takes place in women who are too pusillanimous, too nervous or timid; they are restrained by the fear of making the pains too sharp: they are restless, and toss about from place to place, and rather than assist and make the most of their pains, do all they can to hinder or suspend them.

829. Some of them fall into the opposite kind of excesses, give themselves up to such immoderate efforts, that unless care were taken, very serious consequences might ensue, such as a great congestion of the brain, and even an apoplexy, the sudden swelling of the thyroid body, and the rupture of the large veins of the throat, the formation of hernias of all sorts, temporary paralysis of the lower limbs, &c. The dangers to which they expose themselves by inconsiderately bearing down in this manner, ought to be painted in strong colours and exhibited to their view, and all the means of persuasion and control should be skilfully employed in order to oblige them not to give way so completely to their feelings. If reason, entreaty and gentleness do not succeed, a firm and even menacing tone, properly adapted, sometimes becomes necessary. There are a thousand means to be made use of to quiet them, to inspire them with dread, and restrain them. Thus, Baudelocque, after having in vain exhausted all his resources, thought of bringing two lawyers dressed in their robes into the chamber of a woman in labour, by which she was so intimidated that she thenceforth became reasonable, and submitted to the counsels of her accoucheur.

830. The *touch* is performed at different periods of labour, for the purpose of ascertaining the position of the fetus, the degree of dilatation of the neck, and to learn how far the head has descended. Rigorously speaking, it would be sufficient to touch

three times during a labour: once at the commencement, to learn certainly whether the womb is contracting; a second time, just as the waters break, to make ourselves positively sure of the position; and a third, when the pains and efforts have acquired a certain degree of strength, in order to see whether the parts engage properly in the excavation; but, generally speaking, unless the vulva and vagina are very sensible and irritable, we may repeat this operation much more frequently, and that without any ill effect. Provided the touch were never practised but for the purpose of learning the progress of labour, it would rarely be followed by any other inconvenience than that of annoying the woman and wounding her scruples, how often soever it might be repeated, always excepting the cases where it is made an object of study, as in our public halls, where a very great number of students touch the same woman in succession. But there are accoucheurs who resort to it with very different motives, who, furnished with an apron, the coat off and shirt sleeves tucked up, seat themselves betwixt the woman's knees, and perform what they call her *lesser labour*, and forcibly dilate the vulva and os uteri under the pretext of accelerating the progress of the case. The poor creatures who submit to such procedures, and are even the first to ask for them, do not know to what dangers they are thereby exposed. We might pity those who put them in practice through ignorance or temerity, but what ought we to think of those who make use of them as a system, in order to appear more skilful and important in the eyes of the vulgar?

831. If it be sometimes useful or even permissible to introduce one or more fingers into the vagina, so as to aid in the dilatation of the parts, it is only in cases where rigidity or an irritated condition of some point in the vulvo-uterine canal indicates that it would be well to introduce some mucilage or soothing ointment, such as Galen's cerate, or the cucumber ointment, and not oil, as recommended by Consell. When the head, in engaging in the strait, and even in passing through the excavation, pushes the cervix before it like a cap, there may be some use in supporting the circle with the end of one or more fingers during the pain; but if it is not always dangerous, it is at least always useless to try to overcome its resistance by artificial means.

832. *To support the perineum.* When we reflect on the form of the pelvis and the direction of its axes, it is easy to perceive that the perineum, which is a continuation of the sacro-coccygeal wall of the pelvis, but much less solid, must be violently distended, and run the greatest risk of being torn, as the head emerges from the lower strait. Hence all accoucheurs have recommended some mode of preventing this accident from taking place. Some have supposed, with Mesnard, that it is only necessary to push the coccyx backwards, or to place two fingers between the head

and perineum when the occiput reaches the vulva; others that the object may be better attained with the assistance of Roonhuysen's lever, or a wide piece of whalebone; lastly, some practitioners are content with the application of the hand to the exterior. But inasmuch as, in spite of all these precautions, the perineum sometimes tears, certain modern surgeons have concluded that it is wholly useless to support it in any way. If I can give credence to several young German and English physicians, the accoucheur of the public establishment at Gottingen, and the one who in 1824 directed the lying-in hospital of Dublin, are of this opinion, and I am assured they even go so far as to think that the precautions recommended on this head are all dangerous. As success here depends less upon the means employed than upon the hand that employs them, it is likely that a long time must elapse before everybody can be of one accord as to the value of those that have been proposed.

833. However this may be, the conduct recommended by reason and experience is the following: the hand, either naked, or what is better, wrapped in a linen cloth, is applied transversely, so that its cubital edge may correspond to the point of the coccyx, and that its radial edge may be below the anterior commissure of the perineum, the ends of the fingers may lodge between the labia and the thigh, or extend on to the thigh, while the finger and thumb being separated, are placed between the other labium and opposite thigh. In this way we convert the inclined plane that the head has to pass over in emerging from the soft parts, into a firm wall; the hand is placed there as if to continue the concave surface of the sacrum and coccyx, and as to compel the head to adapt itself to the axis of the vulva; the power that we employ must therefore act from behind forwards, from the coccyx towards the pudendum, and not in the opposite direction nor laterally. We must force the occiput to turn upwards towards the pubis, and not hinder it from descending; besides, it is only at the moment when the head begins to distend the vulva with a certain degree of force, that it imports us to act; previously to this period the operation would be without object, and the accoucheur would prove merely that he is ignorant of its mechanism. By trying to bend the fingers a little, as has been recommended, for the purpose of bringing the soft parts towards the median line, the hand is rendered too concave, and does not support the head sufficiently, and we thus promote exactly what we wish to avoid; by placing the hand, as others recommend, in a state of supination, vertically, with the fingers towards the coccyx, and the wrist towards the vulva, we again miss the object, for our efforts are then directed with more facility in front than behind, while the contrary is what we wish to do. Finally, to prevent, as certainly as possible, any laceration from happening, we may, after the manner of M. Flamant, take

hold of the skin on the buttocks or posterior part of the pelvis with both hands, and draw it forwards as much as possible; it is proper, it is even important, as soon as the parietal protuberances have passed the level of the tuberosities of the ischia, to engage the woman to moderate her efforts, instead of exciting her to bear down more and more, as is too commonly done. This is the moment that the parts, being surprised, or astonished, are lacerated, if the head, pressed too rapidly forwards, does not give them time to yield and mould themselves by it. Therefore, the slower the progress of the head, the greater will be the chance of preserving the perineum uninjured.

I am far from saying that laceration of the perineum is in all cases a serious accident; on the contrary, I believe it to be very rarely dangerous; but the accoucheur ought nevertheless to do all he can to prevent it from occurring; and I cannot too strongly condemn the negligence, in respect to it, of which most of them are culpable. If it be not in our power to prevent the woman from suffering, it is at least a duty to preserve the natural form of her organs as far as possible. The wound will heal up, no doubt; but the dimensions of the external orifice of the vagina remain too large, and we cannot divine what distress may be indirectly produced by this accident, though in appearance a slight one.

834. *To support the head of the fœtus.* As soon as the head has passed out of the vulva, it should be supported by both hands; the fingers being separated, are applied under the occiput, the ear, and lower jaw on each side, being careful not to prevent the act of restitution from taking place. Rigorously speaking, we might dispense with any tractive effort; for the remainder of the fœtus is often expelled with the same pain that delivers the head; or else another pain soon comes on to complete the delivery; however, as there is no advantage to be derived from retarding the termination of the labour, and the woman has nothing so much at heart as to be promptly delivered, it is best to follow up the impulsion given by the womb, and whilst it is still contracting, to draw very prudently and moderately upon the heads or armpits, in the axis of the inferior strait.

The conduct I have just above indicated is particularly applicable in the three true varieties of the occipito-anterior position. It may, and indeed ought to be slightly modified in most of the other presentations.

835. *Occipito-posterior position.* When the occiput looks towards the back part of the pelvis, delivery being in general more difficult, it is natural that we should profit by its tendency to turn forwards, in order that we may by degrees convert it into an anterior position, in which we may sometimes succeed by imitating the natural processes. When the head sinks into the excavation almost immediately after the evacuation of the waters, we endeavour

to make it deviate to the right or left, in the intervals between the contractions, by passing two or three fingers up in front of the sacrum. During the pain, we prevent it from returning to its original position, by leaving the fingers, with which we displaced it, betwixt it and the median line; these attempts are repeated as often as they may be deemed necessary, and if we cannot always succeed in converting the fourth or fifth positions of Baudelocque into the first or second, we are at least sure that we occasion the mother and child both, no additional hazard where the manœuvre is properly executed. The perineum is in more danger of being lacerated in this than any other position; in order to support it efficiently, we should take care not to incline the hand too much forwards, for the point of the head would fall almost perpendicularly upon it, and would rather turn backwards towards the anus than glide in the direction of the vulva. This is the situation in which M. Flamant's precept is especially applicable.

836. *Face positions.* Although the face positions do not render delivery much more difficult than those of the vertex, yet, as they are less exactly according to nature, it is always prudent, where it appears easy to do so, to change them into positions of the vertex. It can no longer be thought of after the head has once reached the excavation; it should be attempted while it is still movable at the superior strait, and that in two different ways: we may either try, with two fingers, to push the chin towards the breast by acting on the forehead, or we may endeavour to hook the occiput, to draw it down and produce the same effect. In both cases we leave the fingers in place until a contraction comes on, so as to transfer to the occipital branch of the lever represented by the head, the power that previously acted upon the facial or anterior branch of it. It would be particularly important to effect this conversion in the mento-sacral position, if it should ever be met with. Further, where the face emerges first, it is not so easy to support the perineum as it is in the vertex positions; but the rupture of the perineum is the less to be feared, because the front of the neck, and not the bregma, presses against the lower edge of the symphysis, while the upper oval of the head passes along the perineum to reach the vulva. The hand ought, therefore, to press but moderately, and not at all until the forehead is without; otherwise we might increase the danger to which the fœtus is exposed, or at least interfere with the termination of the labour.

837. *Inclined positions of the head.* When the whole forehead, or one side of it, the anterior fontanel, one of the parietal protuberances, the upper part of the nucha, the chin, or one of the cheeks is substituted for the frank vertex or face positions, they do not always prevent the delivery from being spontaneous, because the woman's efforts generally succeed in causing the occiput or face to descend. Nevertheless, as these intermediate or *bastard*

positions may, to a certain extent, embarrass the progress of the pains, or of the labour in general, we ought, as soon as they are discovered, to attempt to change them to the regular positions to which they correspond. As long as the head continues at the superior strait, and the womb is not too strongly contracted upon the body of the child, we might hope, by introducing a couple of fingers behind, in front, or on the sides of the occiput, to bring it back to the centre of the strait, or at least, if we could do no better, force it to enter fairly with the face in the opening.

838. *Presentations of the feet.* In maintaining that footling labours commonly terminate without assistance, I did not mean to have it inferred that we must never touch the fœtus in any way until it is completely expelled; but merely, that it is unnecessary, and even dangerous, to exert any tractive force upon it.

As soon as the legs appear, they should be supported, after wrapping them in a napkin; the same is to be done with the hips, the arms, the breast and shoulders; when only the head remains in the excavation, we place a couple of fingers on the chin, in the mouth, or what is still better, on the sides of the nose; two or three fingers of the other hand are slid under the symphysis pubis, so as to support the occiput, and as soon as the least contraction comes on, we draw the whole downwards in the direction of the axes of the inferior strait and vulva, as if we were trying to turn the child's back up over the mons veneris, and upon the hypogastrium of the mother.

839. The head now having nothing to pass through except the perineal strait, is beyond the influence of the uterus, and may be extracted without difficulty; but while ever it has not traversed the uterine orifice, or the abdominal opening of the pelvis, the least attempt to accelerate its escape could tend only to produce a case of real dystocia. As to the perineum, it is easily managed, since it depends upon the accoucheur to pull the head with more or less force, or to incline it more or less forwards, as it passes through the vulva.

840. *Presentations of the knees.* The knees present very few peculiar indications; if they present in a regular position, they should be allowed to come down of themselves, and when they reach the vulva, all we have to do is to assist in disengaging the legs. If one of them assumes a bad direction, lodges against some part of the pelvis, or is arrested by the cervix or some fold in the vagina, it is commonly disengaged without difficulty, and brought alongside of the other one. For the remainder we are to act as in feet presentations, taking care not to pull unnecessarily.

841. *Presentations of the breech.* When the buttocks descend first, and the feet tend to engage at the same time, it is sometimes well to push the latter back, and keep them somewhat raised during several pains; if not, there is nothing to be done until they

get to the bottom of the excavation. It is in this state improper to pull at the breech except during the contractions of the womb; if, however, its size is very great, and there should be some difficulty in its passing through the vulva, the finger hooked into the groin that is towards the sacrum may be of some service by enabling us to give timely assistance to the woman's efforts. The hips are scarcely delivered before the constriction they had experienced is transferred to the child's belly. It is important, then, to pull on the thighs and legs, which should be extended in order to diminish this dangerous compression; the management of the rest of the labour is in all respects similar to that required where the feet or knees present. As the buttocks are escaping from the inferior strait, they sometimes distend the perineum as much as the head does when it comes first; but as they are much softer, and the flexibility of the trunk admits of their accommodating themselves much more easily to the direction of the axes as well as to the forms of the spaces they are obliged to traverse, they much more rarely occasion a laceration; so that in such cases it is not always indispensably necessary to support the perineum.

842. In oblique positions of the breech we must act as in the inclined positions of the head; we must endeavour to restore them to a correct state: if the posterior surface of the coccyx and point of the sacrum are in the centre, the woman should be directed to lie down early; she should be made to lie as much as possible on the back, while the hand applied to the hypogastrium pushes the womb backwards and upwards; if this precaution should not suffice, we might, with a couple of fingers of the other hand, hook the ischia and draw them down into the strait. If one of the buttocks engages alone, with or without the corresponding hip, it should be raised up during the absence of the pains, or we should try to reach it directly, by passing some of the fingers up along its external surface.

Where, instead of one buttock or the coccyx, we meet with the genital organs or fore part of the legs in the centre of the dilated os uteri, it is generally easy to bring the legs down in place of the breech; and this ought to be done whenever both the breech and feet present at the same time, for it would evidently be too difficult to compel the former to engage alone.

843. *Obliquities.* Anterior inclination of the womb may be said to be the only one that demands attention during labour. When it does exist, the fœtus always engages with difficulty; the abdominal muscles being too much curved, contract with but little energy; if, nevertheless, the child's head engages in the excavation, the back part of the cervix rises, while its fore part, which becomes thin and distended, covers the head like a cap, and descends beneath the strait.

This state of things, moreover, cannot fail to embarrass young

beginners. It may lead them to suppose that the dilatation is complete in some cases where it has scarcely begun; finding no os uteri, they most generally begin to dream about anomalies, or else know not what to think about it. Here is what one of my young brethren, who had been practising in the capital with distinction for three years, wrote to me on the 3d of January, 1827. "I have been all night with Madame de S. A.; the labour appears to go on regularly, but I cannot find the os uteri; I have passed the finger up towards the promontory, then towards the iliac fossæ, and also up behind the pubis; at all these places I have reached the cul-de-sac formed by the upper extremity of the vagina, but I have found no cervix; what must I do, what does it mean?" The truth was that the orifice had gone so far upwards and backwards behind the tumour that projected into the excavation, it was necessary, in order to reach it, to crook the finger quite forwards.

Whenever I have met with this peculiarity, which, I repeat it, is very common, the labour has gone on very slowly until the end of the first stage, but I have always found it afterwards to progress with much energy, and to require no particular management.

844. *Tedious labour.* In former times, every physician and every midwife had an oxytocic* remedy, some sure means of bringing labour to a prompt termination; upon this head all the arcana and amulets have had their share of puffs. Some put a bit of precious stone, as jasper, topaz, emerald, &c., in a small bag, which was suspended from the woman's neck; others advised her to hold a piece of loadstone in the right hand; sometimes an eagle's plume was fastened to the thigh, or the first feather of the right wing of that bird was secured to the sole of her corresponding foot; sometimes again she was to have the belly rubbed with viper's fat and snake's gall, or the navel was covered with a very hot snake or rabbit skin; finally, some saffron placed on the hip, some cabalistic sentence on the forehead, the breast or pit of the stomach, and a thousand other absurdities of the same kind, were also frequently made use of.

As M. Désormeaux remarks, it would be almost puerile to make the least mention of such nonsense, provided we were not obliged, from human respect, to reply to certain folks who hold them to be great secrets; and in certain cases to show, like Van Swieten, some condescension for the weaknesses of females. These remedies at least will do no mischief, and may perhaps prevent the administration of some less inoffensive remedy.

The aromatic waters, as balm and mint waters, the tinctures of canella, of cloves, all sorts of compounds, and all sorts of alcoholic elixirs have each had their day, and many women who have used them have fallen victims to their imprudence. Purgatives and

* From οἶστος quick, and τοκος child-birth.

emetics have had great vogue even among medical men, and are not yet wholly forgotten by the vulgar. Preparations of manna, or of senna, to which, by way of corrective, was added lemon or orange juice, were very much used in the time of Mauriceau; but, without denying that such preparations may possess the faculty of restoring the pains in some particular cases, and without fearing their action on the alimentary canal, so much as some physicians of our day do, it is notwithstanding, manifest, that, if they ever may become dangerous, it is chiefly to women in labour that they are likely to be so.

845. Purgative articles, given in the form of clysters, are not attended with the same disadvantages, and, in fact, they appear to have been employed in this way with some advantage: amongst others, the decoction of senna, whose operation is generally accompanied with smart colic, is perhaps not to be wholly neglected. It is at least certain that I have, at the *Maternité* of Tours, seen it impress upon the contractions an energy that could scarcely be attributed to mere chance. Bleeding, baths, antispasmodics, opiates, borax, and many other articles, are, in the opinion of some persons, possessed of very decided oxytotic properties; but in order not to be misled in this manner, we should be careful not to confound what depends on time, circumstances, or chance, with the real effects of the means employed, and never lose sight of the possibility of those singular coincidences which often put to flight the most skilful combinations.

846. Labour sometimes progresses with extreme slowness, and may last from two to five or even eight days, without there being any thing particular to be done, and that in two opposite cases; 1. In young nervous women at their first lying-in, and who are of a rigid and excitable fibre; 2. In those of a delicate, feeble, and lymphatic constitution, or where the os tincæ is very soft for some time before the full term. In the former, the labour can with difficulty set in fairly, because the orifice is too resisting, or of too great a degree of sensibility; here a small bleeding, if warranted by the state of the pulse, and the strength and habitual coloration of the patient, a tepid bath, unctions with belladonna ointment, and slightly narcotic and soothing drinks may sometimes be employed with advantage; in the latter, it seems as if the womb were in a state of uncertainty, as if it were assaying its strength, as if under the necessity of preparing in silence before entering openly into action; I have seen some remain two, three or four days in this state; but when the contractions once acquire a certain degree of energy, the labour terminates in general with an extreme rapidity, which singularly contrasts with its former slowness; indeed, it is to this circumstance that a crowd of remedies are indebted for the vogue they enjoy. Nature here has no need of assistance, this slowness is necessary for her, and it ought not

to be disturbed in any way ; we are merely permitted to support the strength by giving some analeptic aliments, or a few spoonfuls of wine, repeated from time to time, and always with the greatest reserve.

847. On other occasions, the pains, after having been regular and pretty smart, begin to return only at long intervals ; sometimes this is owing to the general weakness of the woman or the fatigue of the womb ; sometimes, on the contrary, it must be referred to ill-directed efforts of the womb, or to its not possessing a great share of excitability. In the former case, rest, and some broth, if there be any appetite, a little wine if there be not too much thirst and heat, and resignation, are all that we can recommend. In the latter, we also recommend rest, if the woman is much fatigued, but otherwise she should be advised to walk about ; for it cannot be denied that walking about and a vertical posture positively accelerate the progress of labour.

Time and patience are here the great remedies ; but this is a sad resource for one who is in a state of suffering, and the accoucheur must expect the most multiplied solicitations, and all sorts of proposals and entreaties from all the bystanders. As long as they are satisfied with amulets and inert topical applications, and do not insist on giving active substances internally, they should be allowed to say and do as they like ; it is one way to amuse the women ; while they see us busy in regard to their sufferings, they bear them more courageously. Should the practitioner be compelled, for the sake of quiet, to prescribe some remedy, he should follow the advice of Mauriceau, and, in the first place, make a bargain with the patient, obtain from her as much time as possible, and promise her that, if at such an hour the pains do not return, he will then cause them to begin again ; then, when the hour agreed upon arrives, if the pains continue to be still weak, take care that the article to be made use of cannot be procured except from some considerable distance ; that the person sent to bring it be a dull messenger, who will be apt to lose his way ; let it be some sort of wood, or bark, or root, or at least some hard substance. When the remedy at length arrives, it must be pulverized or rasped for a long time ; after which it should be boiled for several hours. In the next place the liquid must have time to cool ; it is next passed through a piece of linen, something more is to be added, and then it should be boiled over again ; at last it is given to the patient, and as three or four hours are necessary for it to produce its effect, it is easy to see that we may in this way gain more than half a day, and that within that interval the pains will rarely fail to resume their natural course.

848. In certain cases the labour becomes slow, because the contractions are difficult, extremely painful, unequal or partial. The first mentioned case ordinarily depends upon plethora, either local

or general, which is the cause why the uterine fibres, engorged with blood, and as it were stupefied, cannot contract with suitable energy; women who are strong, robust, sanguine, and very muscular, are most liable to this state of things, which is known by a feeling of general uneasiness, weight and distress felt in the hypogastrium and pelvis, a highly coloured skin, and especially by the pulse, which is either strong and large, or contracted, small and hard; in this case, bleeding from the arm, by means of the depletion it occasions, frequently succeeds in restoring to the pains all necessary activity.

The second case may be met with alone, or concurrently with the former; and as its cause is an exalted sensibility, whether natural or accidental, of the whole economy, or of the sexual organs in particular, it is proper after bleeding, if that has been deemed useful, to have recourse to baths, to the mildest anodynes, and even to the thebaic preparations.

The third case is of much more frequent occurrence than the generality of practitioners suppose, and I can hardly comprehend why the authors make scarce any mention of it in the treatise put into the hands of students. The work of Wigan, which is highly esteemed in the north, proves that these contractions have fixed the attention of the German accoucheurs in a very special manner: among us hardly anybody but Madame Boivin speaks of it; but Burns and Dewees treat it somewhat more at length. Sometimes it is the fundus of the womb that contracts thus spasmodically, while the rest of the organ hardly contracts at all; sometimes, again, it is one of its angles, a portion of its anterior wall, of its posterior wall, or one of its sides; the pains are not less acute than they would be if the whole organ contracted, they may even be more severe, but they are in pure waste, or at least, far from having as much influence on the progress of the labour as the regular contractions. If the parietes of the belly are not too thick, we can, by applying the hand upon the hypogastrium, feel that the uterine ovoid is not even, that there are lumps or inequalities, and that, too, independently of the form of the fœtus. Wigan, who gives to this disposition the appellation of tetanus, appears to me to have made too many divisions; practice can derive no benefit from it, and theory gains by it nothing but confusion.

Whenever the general state of the patient does not contraindicate it, we must here also have recourse to bleeding, then to baths, and next to simple anodynes, diffusible antispasmodics, opiates, &c. I, for example, use with success a potion composed in the following manner: R Lettuce and wild poppy water ℥iv, orange flower or mint water ℥j, syrup of pink or white poppies ℥j, or syrup of marshmallows ℥j, with extract of opium gr. i, or laudanum, from grs. v to grs. x. Simple frictions on the belly,

long continued, also succeed pretty often. They are sometimes performed with the hand alone, or with a flannel, either dry and hot, or wet with oil of chamomile, camphorated alcohol, or Cologne water, &c. Although nature herself frequently succeeds in restoring the natural order of things, this state is, notwithstanding, not to be overlooked, in the first place, because it indefinitely prolongs the labour, and in the next because it may be looked upon as a morbid state, or at least as evidence of great predisposition to diseases, or to inflammation of the womb.

849. Spasmodic contractions of the os uteri have also been observed, and I have several times seen its dilatation completely arrested, or considerably retarded for hours together by this irregularity, which in general requires the same treatment as the preceding. In some instances, the os uteri is at the same time very sensible, dry, hot, highly irritated and painful, although regular in shape; a valuable remedy in such a state of things, and far more efficacious than hip baths, and emollient, mucilaginous, or narcotic injections, or various sorts of ointments usually recommended, is found in the belladonna ointment, proposed by Chaussier and Dr. Conquest, and frequently made use of by Madame Lachapelle at the *Maison d'Accouchement* at Paris. Its employment, too, is followed with no inconvenience: when I have occasion for it, I direct one drachm of the juice or extract of belladonna to be triturated with one ounce of cerate or hog's lard; with the fingers I easily introduce a portion of this ointment, as large as a filbert, up to the os uteri, the whole circumference of which is soon anointed with it. The belladonna acts here as it does upon the iris, when applied betwixt the eyelids a few hours previously to performing the operation for cataract, and often with a promptitude that is really surprising.

In the spring of 1825, a young woman of good constitution was seized with labour pains at five o'clock in the evening; the labour went on regularly all night. The next morning, at six o'clock, the os uteri was as large as a three livres piece at least; from that time the dilatation progressed slowly, although the force of the pains did not diminish at all; a vein was opened in the arm; the agitation of the patient went on increasing, and the orifice continued in nearly the same state. M. Ribail, who had the care of the woman, sent her to the hospital, where I saw her at half-past six in the evening: the os uteri was a little larger than a five franc piece, and formed a thin circle, almost sharp, hot and extremely sensible; the pains still continued; the ointment was applied at seven o'clock, and before the clock struck eight the delivery was completed.

Conclusive as was this result, it nevertheless appeared to me difficult to attribute it exclusively to the action of the ointment, but since then I have used it in five different cases, and in all of

them the effect has been, if not altogether as prompt, at least quite as undeniable.

850. I have elsewhere said in what manner the premature rupture of the membranes, or their too long continuance in an unbroken state, might retard a labour or render it a bad one. In the former case we ought to do every thing in our power to favour the dilatation of the orifice without increasing the power of the uterine contractions, for it is important to relieve the fœtus as soon as possible from the dangerous compression it has to suffer; to fulfil this indication, it appears to me to be proper to direct the woman to walk about, to moisten the parts in some way, and especially to have recourse to the ointment of which I have just been speaking.

In the latter, that is, where the point of the ovum is too slow in giving way, it must be ruptured. To be done without inconvenience, this little operation requires the combination of the following conditions: 1. That the dilatation shall be, at least, very much advanced; 2. That the pains shall be maintained, without any threatenings of inertia; 3. That the child shall be in a good position; and 4. That there shall be no other obstacle to the delivery.

851. Should the os uteri not be largely dilated, we should be exposed to the inconveniences connected with a premature rupture of the membranes; if the womb should cease to contract, or contract only a little, we might give rise to complete inertia and all its consequences; were the fœtus badly situated, we should increase the dangers of the presentation, and should the resources of art become necessary, their application would be far less easy. But it should be well understood that these general rules are not without exceptions; for instance, where the fluid enclosed in the amnios is in too large quantity, it may be allowed to escape even although the opening of the cervix is not considerable; the same holds, too, where the position of the child is not fixed, where the hips, shoulders, head, or any other part is found to present by turns at the centre of the strait. In this case we seize the moment when the head is well situated to rupture the membranes, because, were this rupture left to nature, it might as well take place while it is unfavourable as while the position is favourable. Where the bag of waters does not retain the shape of a segment of a sphere, is very much elongated, or pyriform, its presence being no longer of any use as to the progress of the dilatation, it should be broken without too much regard to the degree of the dilatation. The same principles guide us in respect to the strength of the pains; their absence ought not always to deter us, for the rupture of the membranes is often the best, and sometimes the only means of restoring them.

852. To effect this rupture there are a thousand different modes

of proceeding: the point of a bistoury, of a pair of small scissors, of a common sewing needle or a knitting needle, of a pin, directed by the pulp of the fore finger, has often been found sufficient, and perhaps been employed with advantage; for one must be very unskilful or careless seriously to wound the mother or fœtus with either of those instruments; however, at the present day we proceed generally in a different manner; the membranes are scratched through with the finger nail, while they are tightly stretched; or we endeavour to burst them with the end of the finger by suddenly pushing upon the tumour from its point towards its base; and if the first attempt does not succeed, we make a second, a third, &c., always during the height of the pain; or again, and the method is a better one, we firmly pinch a fold of the membrane, while in a state of relaxation, and in such a way that the next contraction of the uterus in essaying to form the bag again, does not fail to rupture them.

Where the membranes have given way spontaneously very high up above the cervix, and the tumour that had engaged in the vagina does not disappear, and seems to interfere with the progress of the natural phenomena of the labour, we ought most generally to perforate them as if nature had not yet effected it. Lastly, when the membranous sac does not permit the liquor amnii to escape until long after the dilatation of the orifice, as it is generally found that the rest of the labour proceeds with great celerity, the woman should always from the time the rupture takes place preserve a horizontal posture.

853. Another cause of protracted labour is the weakness, whether absolute or relative, of the uterine contractions; this is almost always the cause that is kept in view by the authors of oxytocic remedies; nevertheless it is far from being the most common one, and as the means proper to overcome it are most generally hurtful in the other cases, it is easy to explain the discordance met with in the works on the effects of substances employed to accelerate the process of parturition.

When the inaction of the womb is evident, and depends neither upon general nor local fatigue, when it prevents the labour from proceeding, and the attention and regimen which were spoken of at the commencement of this article have been tried in vain, and especially when, instead of diminishing, it goes on increasing, hour after hour, those substances that seem to exert a special action on the gestative organ should be tried. This is the case in which small injections of senna are indicated; in which stimulants in general are indicated; in which the borate of soda, extolled by the ancients, by Homberg among others, and in our own day by M. Lobstein, might be successfully administered; but a substance is now known that seems to deserve a preference over all others, and of which I am about to speak in more detail.

854. The ergoted rye, *clavus*, *secalinus*, *secale luxurians*, *calcar*, *secale mater*, (blé farouche, blé noir, blé cornu, blé ivre, ergot, seigle éperonné, clou de seigle, seigle de matrice,) seems to have been used from time immemorial by the old women, and by some country midwives for the purpose of hastening delivery; it was mentioned in the *Acta Natur. Curios.* for 1688, and the title of *womb-rye* which was adopted by the Germans shows that this idea was not a new one. These traditions of the vulgar at length attracted the attention of the profession, and M. Desgranges published his first researches upon the oxytocic properties of the ergoted rye in the *Gazette de Santé* for 1777. Since that period numerous observations have been collected and made public in the American, English and French journals, &c. &c. Stearns, Prescott, Chapman, Bordot, Goupil, Chevreul, Legras, Bigeschi, Gendrin, and especially M. Villeneuve, have collected an infinite number of facts that prove decisively that the ergot of rye is capable of restoring the contractions of the womb during labour. However, MM. Désormeaux and Capuron do not appear to have much confidence in it, and Madame Lachapelle has published a long series of experiments, which tend to show that it enjoys no property of the kind, whether given in fine or coarse powder, in infusion or in decoction, in extract or in syrup. In the last four years I have used it more than twenty times; M. Delanglar and M. Terreux have also used it at my solicitation, and in every case its action has appeared to be evident, undeniable. It forces the uterus to contract in a few minutes, in a quarter of an hour, or, at most, in twenty minutes after it is exhibited. I have very recently had another most convincing proof of its efficacy: to a young woman who had been twenty-four hours in labour, I gave three doses in the space of forty minutes; within five minutes after the first one, the pains, which had for several hours been very feeble and slow, suddenly became strong and very frequent, but soon relaxed again; the second dose brought them back in the same way: they diminished a second time, and it was not until after the third dose that they were maintained until the complete expulsion of the fœtus, which soon took place.

I prescribe it in the quantity of fifteen or twenty grains in a spoonful or half a wineglassful of sweetened water, and repeat the dose two or three times, at intervals of fifteen or twenty minutes. Perhaps a larger quantity may be safely given: Parmentier took half a drachm of it; MM. Lapre and Camperton a drachm, and a drachm and a half, for several days together, without experiencing any sensible effects from it; its use might, therefore, be continued for a long time and in large doses, before any well-grounded fear of inducing *ergotism* could be entertained.

855. It is to be hoped that the chemists will ere long separate the essentially active principle of this substance; MM. Desgranges

and Lapre have already observed that four or five grains of the bark produce a greater effect than twelve or fifteen of the entire grain. I have no doubt that a preparation will be discovered ere long, whose energy shall be uniform; but, meanwhile, a fine powder made of the entire grain appears to me to be preferable to the decoctions, extracts, &c.

856. In order that the ergot of rye may be given with some chance of success, and without any danger, it is necessary, 1st, that there should be no manifest tendency to hemorrhage from excess of irritation; 2d, that it be possible for the delivery to take place through the natural passages; 3d, that the child be in a good position; 4th, that the cervix be soft and dilatable; 5th, that the general irritability be not too great; 6th, that the digestive organs be in a good state, and 7th, that the weakness of the uterine action shall depend upon the want of irritability of that organ. M. Legras advises that it be given, also, for the purpose of steadying the head at the superior strait previously to applying the forceps.*

ARTICLE III.

OF DYSTOCIA,† OR DIFFICULT LABOUR (PRETERNATURAL LABOUR, LABORIOUS L., MECHANICAL L., MANUAL L., ARTIFICIAL L., &c.)

857. Labour ceases to deserve the title of spontaneous, whenever by leaving it wholly to the powers of nature, it threatens to become dangerous either to the mother or child. These kinds of labour were for a long time designated by the simple epithets of preternatural or laborious: but the distinct acception that was attempted to be given to each of these qualifications being quite arbitrary, too much confusion has ensued among the authors who adopted them not to make it desirable to replace them by others. As the

* Many children perish in this country from the improper use of ergot.—The power of the article ought not to admit of further doubt: it excites generally within thirty minutes after its exhibition, a contraction of the womb which does not wholly cease until the child is born; or in case of any insurmountable resistance, until the strength of the uterus is exhausted. The ergotic pain is a single pain; hence, if the parts are not in a state to admit of the proper dilatation, the ergot destroys the child by causing a contraction or spasmodic effort of the womb which presses the placenta so firmly and so long against the fetus, that the utero-placental intercourse is as effectually destroyed as it would be, were the after-birth detached. The child which is killed by ergot, dies therefore by asphyxia from the compression of its placenta. Where the os uteri is well dilated and yielding, and the vagina and vulva in a similar condition, no danger can ensue upon the use of this powerful and valuable article.—M.

† Dystocia, from *δυσ*, “with difficulty,” and *τοκος*, “accouchement.”—H.

term *dystocia*,* employed by Hippocrates, Sauvages, and M. Désormeaux, expresses all the cases that require the assistance of art, it appears to me the most proper one, and will doubtless be preferred at a future day as a generic term.

858. As the subdivisions to be established, it is contrary to the rules of reasoning to found them upon the nature of the means that are employed where nature is insufficient for us any longer to conform to the principles laid down by Solayres, Baudelocque, &c. The faults of such a method are too evident for it to be necessary to enumerate them; it should suffice us to remember that by following them, the same cause of *dystocia*, the same accident, for example a hemorrhage, may by turns cause the same fact to be classed by turns among the preternatural, laborious, mechanical, mixed, manual, &c., labours, according to the ability or good pleasure of the accoucheur.

It is, therefore, infinitely better to base them upon the causes that may give rise to difficult labour. This plan which has been adopted by Merriman and M. Désormeaux, exhibits real and indisputable advantages; it readily applies to all possible cases, enables us to reduce or multiply genera and species without in any way interfering with the general classification, and, besides, can combine with all the other methods proposed by the various authors. After all, difficult labour is characterized by the accident which complicates it, and not by the kind of assistance required in it.

859. The causes that render labour difficult depend either upon the mother or the child. Some of them are unforeseen, or do not occur until the moment of parturition; the title of accidental may be appropriated to them. Others exist beforehand, and render the labour necessarily difficult: they merit the denomination of pre-existing causes.

The *accidental* or unforeseen causes are: any serious disease, such as inflammation of the brain or its coverings, of the lungs or pleura, of the peritoneum or uterus, &c., which takes place during labour: any hemorrhage sufficiently abundant to endanger the life of the mother or her offspring; convulsions, syncope, laceration of the womb, the premature escape of the cord, hernia, aneurism, asthma, great debility, &c., and some positions which do not become bad until after the first pains.

The *pre-existing* causes are: deformities of the pelvis, malformation or disease of the organs of generation, calculus in the bladder, fibrous or other tumours in the excavation, deformities in respect to height, transverse positions, monstrous conformation, and diseases of the fœtus.

As these different causes are in reality only complications of

* From *δυσ* an inseparable article which imports *difficulty*, *trouble*, *misfortune*, and *τοκες*, child-birth.

labour, it follows that dystocia comprises all cases of complicated labour, as eutocia comprehends all simple labours.

SECTION 1.

Accidental Dystocia.

§ I. OF HEMORRHAGIC DYSTOCIA.

Whether the hemorrhage be an epistaxis, an hemoptysis, an hematemesis, a hematuria, or a metrorrhagia, any one may conceive that the efforts of child-birth must to a considerable degree augment the danger which accompanies it. In the first five-named cases we are to act as we should do in relation to all hemorrhages in general; and if the blood still continues to flow, we should begin to think of terminating the labour as promptly as possible; the sixth-named case, uterine hemorrhage, is met with so frequently, constitutes an accident of so serious a nature, that it becomes necessary, in this place, to examine it, not only as a complication of labour, but also as one of the essential and distinct diseases of pregnant women.

860. This hemorrhage is called *internal*, *latent*, or *concealed* hemorrhage, when the blood that flows from the vessels is retained in the womb and does not escape from the genital organs; it is, on the contrary, denominated *external*, *apparent*, when the sanguineous fluid escapes from the genital organs as fast as it is poured out by the mouths of the vessels. It is owing to two kinds of causes: *efficient* causes, and occasional or *determining* causes.

861. From the time of Puzos, accoucheurs have generally placed the efficient cause of flooding in the detachment of the placenta; they state that the placenta separates itself from the internal surface of the womb, and thenceforth the blood flows abundantly from the large and numerous vessels which open on it; this opinion appears to me to be ill-founded. Puzos and his partisans have mistaken the effect for the cause. It is not the detachment of the placenta that produces the hemorrhage, but the hemorrhage on the contrary that detaches the placenta: blows, falls and great shocks may certainly affect the womb and its contents; but as the ovum constitutes a full bladder in immediate contact with the whole extent of the cavity of the organ that contains it, the most violent commotions would not be able to detach it. While ever the membranes remain unruptured, it cannot be conceived how the adherences of the placenta can be destroyed otherwise than by the efforts of a fluid endeavouring to effuse itself into the cavity of the womb. It is astonishing that such a doctrine should have been maintained so long by so many celebrated men; for even admitting a previous detachment of the pla-

centa, we should still have given no explanation of floodings. In fact this detachment takes place every day, either wholly or partially, from the middle stage of the most natural labour, and notwithstanding there is no hemorrhage. Besides, an anatomical disposition that has no real existence is relied on here; the ovum is merely stuck (plaqué) on the inner face of the womb, and not intimately united to it; the placenta and organ of gestation communicate with each other only by means of pores, and not by means of large vascular mouths.

862. The efficient cause of flooding seems to me to be analogous to those of all other hemorrhages, to that of epistaxis, for instance. The sanguine exhalation takes place in the womb as it does in the nose, under the influence of a local congestion, an affluxion, a peculiar state of irritation, of the *molimen hemorrhagicum* so much talked of by Stahl. When this affluxion, or *molimen*, exists to a certain degree, the blood transudes with greater or less force, and from a more or less extensive surface, as happens during the presence of the menses; only it requires a stronger impulsion, because, during pregnancy, the ovum that it is compelled to detach in order to effect a passage, necessarily presents a certain degree of resistance to it; moreover, it seems to me, that in respect to its intimate mechanism, an uterine hemorrhage that does not depend upon any traumatic lesion, is always the same, at whatever period and in whatever condition it may occur, as well during gestation as during and after parturition.

The idea which I now set forth, and which is nearly similar to that which has already been taught by Costa, M. Désormeaux, Madame Lachapelle and M. Dugès, merits the most serious attention, and ought to have great influence on the therapeutics of flooding, and upon some other points of tokological science.

The *determining causes* are as numerous as they are diversified; they may be referred to a general state of the woman, to a peculiar state of the sexual organs, and to external accidents.

863. *General state.* Stoll, Finke and other observers have remarked that during the prevalence of certain epidemics, all the bilious affections were accompanied with metrorrhagia; it has been stated that verminose diseases, various lesions of the alimentary canal, and all those indispositions that are accompanied with sympathetic reaction upon the womb, are capable of giving rise to it. Fatigue, frequent attendance at balls, plays, whole nights passed without sleep, and exciting regimen, heating liquors, purgatives, the warm bath, substances used to produce abortion, moral commotions; in fine, whatever tends to render the menstrual flux more abundant and more precocious, is also capable of giving rise to the flooding; to these causes may be added an ulcer, a polypus at the neck of the womb, fibrous and other tumours in the substance of the parietes, or in the neighbourhood of

the external surface of the uterus, criminal manœuvres, and every thing calculated to produce a determination of fluids towards the pelvis; violent exertions, the jolting of a rough-going carriage, riding on horseback, efforts to carry or lift a heavy burthen, coughing, vomiting, shocks communicated to the trunk of the body by falls upon the feet, the knees or seat, blows on the abdomen or pelvis, diseases of the rectum and bladder; in one word, all conditions, whether of temperament or of disease, all circumstances, whether natural or eventual, that are capable of producing a sanguine congestion, a *raptus* towards the vessels of the womb, and all the causes of abortion; so that pregnancy and labour in themselves constitute one of its most powerful causes.

864. In some particular cases, an *entirely special* cause of hemorrhage is superadded to the preceding ones, and may of itself produce the flooding; I mean the implantation of the placenta upon the cervix uteri.

Whether the placenta corresponds to the orifice by its very centre or by some point more or less near its circumference, there results nevertheless a hemorrhage whose distinctive character is, that it occurs only in the last months of gestation, or from the period when the cervix uteri begins to dilate from above downwards. The authors who attribute it to the rupture of the utero-placental vessels have certainly been deceived by theoretical prejudices, or false anatomical appearances. I offer the following as the results of several observations collected with great care.

When the placenta is inserted upon the neck of the womb, these two parts proceed together in their development until about the fifth, the sixth, the seventh, and sometimes even until eight months and a half; but from that time forwards, the environs of the orifice are so rapidly withdrawn from the centre, that a constantly increasing portion of the ovum necessarily remains without any adherence to the womb, and this portion, which is soft, vascular, and constantly on the stretch, may crack, or even tear, and thus give rise to a hemorrhage which puts the child's life much more at hazard than the mother's. On the other hand, this displacement does not in general take place without the inferior portion of the womb being more or less irritated by it, and soon becoming the seat of an affluxion, a more or less decided congestion, and thenceforth the *general efficient cause* of floodings is superadded to the peculiar cause constituted by the presence of the placenta on the cervix. Is it necessary for me to remark that these two causes, the rupture of some vessels of the placental parenchyma, and a state of congestion of the uterus, may exist separately, that although the former almost always superinduces the latter, it is not, however, impossible for it to exist alone, and that the latter may pre-exist, or even exist to such an extent as to give rise to the most imminent danger, without necessarily combining with the other?

Besides, it is well known, that blows, shocks, vivid emotions, and all the other causes of ordinary uterine hemorrhage are equally fitted to produce it where the placenta is inserted over the orifice; it therefore follows that both these kinds of flooding depend on the same proximate cause, the hemorrhagic *molimen*, and upon the same occasional causes; but that the presence of the placenta upon the cervix constitutes a peculiar determining cause, which rarely fails of being in itself sufficiently powerful to produce it.

865. *Vessels of the cord.* It is at present pretty generally believed that the vessels of the umbilical cord may break during labour, and give rise to one of the most serious kinds of hemorrhage. Doubtless, it would not be wise to deny the possibility of such an accident: but it must be confessed that the observations relied upon to prove it are any thing but conclusive. The one mentioned by Lamotte was evidently only a case of ordinary hemorrhage: the blood had begun to flow previously to the rupture of the membranes; the woman rapidly grew weak, and the author believed that the hemorrhage took place from the cord, because he found one of its vessels to appear as if *eroded* to such a degree as to admit of the transudation of blood. Levret's case, when carefully analyzed, proves nothing more in favour of the opinion of the surgeon of Valogne; and the case by Baudelocque, who at first refused to coincide with the opinion of Levret, certainly ought not to have induced him to change his views. Had the rupture of the cord been the cause of the hemorrhage, the *fœtus* would not have been born alive in the cases reported by De la Motte and Baudelocque. In the example cited by Levret, the *fœtus*, it is true, was dead born, but the forceps had been employed, and the meconium continued to come away while blood was still flowing. In fine, in all three cases, the mothers became so weak as to excite the serious alarm of the accoucheur; which seems to me clearly to demonstrate that the blood came from the uterus and not from the child. Did the nature of this work admit of it, it would be an easy matter for me to show that none of the reasons invoked by these authors are capable of demonstrating the correctness of the opinion they desire to support: let it suffice me to say that in the actual state of our knowledge, the hemorrhage from the cord, as understood by De la Motte, Levret, and Baudelocque, can only be admitted as possible, and not as proved. In this respect, moreover, I am completely of accord with Mesdames Boivin and Lachapelle.

866. Nevertheless, the umbilical vessels, and their branches ramifying upon the *fœtal* surface of the placenta, are sometimes subjected to rupture; I am in possession of several examples of the kind; but it is because they were previously in a diseased state, and that too generally in the early periods of pregnancy. Then, the *fœtus* dies promptly, abortion takes place, and the

hemorrhage is not discovered until the ovum comes to be examined. I have very often found embryos of six weeks, two months, &c., still enveloped in the membranes, separated wholly or partially from their cord, close to which were discovered one or more small clots of blood; at other times small varicose or aneurismal sacs, sometimes upon the cord, sometimes upon the secondary divisions of its vessels, the walls of which are exceedingly thin, and liable to be ruptured by the slightest effort. In an after-birth at full term, I have seen some of these dilatations that had been ruptured, and which communicated with a large clot covering a part of the placenta, and which had not lacerated the amnios; but it is easy to perceive that this kind of accident is but indirectly similar to those spoken of by authors.

867. *Diagnosis.* Uterine hemorrhages have certain common symptoms and certain peculiar signs; among the general signs, there are some which announce the approach of hemorrhage, and others which accompany or succeed it.

868. *Precursory signs.* Although in some women the flooding appears on a sudden, and without any precursory symptoms, it is not the less true that this accident is almost always preceded by a more or less decided disorder of some function. Thus, one or more hours, or one or even several days before the appearance of the blood, the individual has a sense of uneasiness, restlessness in the limbs, weight, fullness in the pelvis, alternate flushes and chills throughout the body, and rather more thirst and less appetite than common; flushes of heat ascend to her head; she has fits of giddiness, and becomes much redder or paler than in her habitual state; the pulse acquires strength, frequency, and quickness; there is, pretty commonly, a degree of febrile action.

869. *Signs of flooding.* When a quantity of blood sufficient to excite alarm has flowed, the pulse loses somewhat of its strength and hardness, soon becomes irregular and tremulous; the face grows pale and the skin cooler; dimness of sight, ringing in the ears, and *weakness of the stomach*, which induce the woman to ask for some kind of aliment; yawning, pandiculation, nausea, lipothymia, syncope and even convulsive movements appear in succession, and sometimes with frightful rapidity.

In external floodings, the precursory symptoms are succeeded by a discharge of blood from the external organs, and this characteristic is too evident for it to be needful to indicate any others; nevertheless, it has appeared to be difficult to some persons, not to confound, at times, a real flooding with a simple menorrhagia. Baudelocque did all in his power to clear up this point of diagnosis: according to him, menstruation occurring during pregnancy differs from metrorrhagia, properly so called, in respect that it takes place without any pain, without effort, without any notable disorder of the health, without any antecedent *molimen*; in respect

that the fluid which escapes is serous, very slightly coloured, and does not coagulate; in that it is very small in quantity, terminates in two, three, or four days, appears at the ordinary epochs of the menstrual flux, and that far from debilitating, it is, on the contrary, followed by an improved state of health, and greater freedom in the exercise of the functions; while the very opposite circumstances are observed in a real hemorrhage. But, in looking a little closer at the subject, it is soon found that these characteristics are for the most part quite illusory. In the first place, it is a fact that, in many women the menses are frequently preceded by the same symptoms as the most dangerous floodings, and that the blood of the menses, far from being fluid and colourless in all cases, is, on the contrary, sometimes charged with cruor and very coagulable; besides, flooding is not always accompanied or announced by the general signs heretofore indicated; it may be very moderate in the beginning, and formed of serous blood, or blood charged with fibrin, and coincide with one of the catamenial epochs; indeed, as the mechanism of menstruation is the same with that of metrorrhagia, I do not see that it is possible to distinguish the one from the other by any special signs. Moreover, this differential diagnosis leads to nothing; while the flow is slight, the precautions prescribed by art are incapable of interfering injuriously with the menstrual function; and as soon as the blood escapes in sufficient quantity to require more active interference, it would be almost ridiculous any further to seek to discriminate between menorrhagia and metrorrhagia.

870. In *internal flooding*, admitted by Mauriceau, De la Motte, Levret, Baudelocque and Merriman, who have related cases of it, the blood tends to accumulate between the placenta, or membranes, and the corresponding part of the womb; a lenticular coagulum might in such case form with variable rapidity, depressing the ovum in an eccentric manner on the one hand, and on the other compelling the uterus to distend mechanically, so as to receive the fluid that is effused: I am aware, that in presence of facts, argument ought to be silent; but then, those facts ought to be incontestable, well noted, and properly interpreted: now can these conditions be recognized in a majority of those that have been mentioned in favour of internal floodings? Is it quite certain that the blood in some instances found betwixt the placenta and the womb had accumulated there during life, rather than immediately after death; that that which escaped in torrents as the membranes gave way was not effused before hand in the interior of the amnios? How, indeed, can we conceive that the blood which escapes from the uterine vessels in somewhat considerable quantities is capable of dilating beyond measure, and almost instantaneously, the cavity of the womb, instead of running between the gestative organ and its contents, so as to escape out-

wards, or of rupturing the membranes and becoming effused within their cavity? How can we admit that the adherences of the placenta, which are habitually so weak, could resist the effort of the blood, tending to form a new cavity for its own reception, more powerfully than the uterus, which yields with so much difficulty?

Until these various questions shall be solved rigorously, I shall continue, with Mesdames Boivin and Lachapelle, to think that the existence of internal flooding, such as it is generally understood, ought not to be admitted, except under pretty numerous restrictions, and also, that what has been hitherto said in relation to it needs confirmation.

It should in all cases be accompanied with the same symptoms as external hemorrhage, from which it should be distinguishable only by the absence of blood flowing externally, or by the natural size of the womb or abdomen.

871. *Flooding with implantation of the placenta over the cervix.* According to Rigby, flooding produced by the attachment of the placenta in the vicinity of the orifice, ought to be of extremely frequent occurrence, for, in one hundred and six cases, he met with it forty-three times; and Madame Lachapelle goes so far as to say that uterine hemorrhage occurring in the last three months of pregnancy, depends almost upon no other cause. Be this as it may, this kind of flooding is distinct from other species, in that it never takes place before the fifth month; that the blood at first flows in small quantity, and stops of its own accord, to reappear in greater abundance after a week or two; in that it pretty often comes on without any assignable cause or precursory symptoms; that it returns after shorter intervals, and is in greater abundance as the stage of pregnancy is more advanced; in that during labour the blood flows especially during the contractions, and not in the intervals, as in the other species. When it commences early, as the blood flows in small quantity, the woman becomes exhausted but slowly, the muscles become œdematous, the face is bloated, the lips grow pale, and the skin soon assumes a dull yellow tint, the colour of wax, through its whole extent. These, however, are only rational signs, which may even not be met with near the commencement of the flooding; whenever, therefore, it becomes desirable to remove all doubt upon the subject, recourse should be had to the touch. The orifice is, in general, very soft, and somewhat dilated; instead of the membranes, a spongy body is felt, engaged, as the point of a cone with a large base might be, in the upper part of the cervix; but care should be taken not to mistake a coagulum of blood for the placenta, and in order that the operation should not be performed unnecessarily, to recollect that this exploration may possibly reproduce the hemorrhage, by disturbing the concretions by means of which the economy had succeeded in suspending it.

872. Instead of following the course that I have just indicated as the most general one, the hemorrhage sometimes pursues a very different one. M. Duparcque has seen a case which came on as early as the sixth month, which ceased spontaneously, and did not return until the appearance of the labour. M. Désormeaux has met with it once in the fifth month; and it became so profuse in the sixth, that it was found necessary to deliver the woman. I have seen a case where it did not appear until the end of the ninth month, in a woman to whom I was called by M. Baroilhet, and where it did not become serious until the approach of her confinement, although the centre of the placenta was situated over the orifice. In other cases, especially in first pregnancies, and where the uterus is very much inclined in front, the os uteri is sometimes so little opened, and so high up, that the blood may accumulate below it, to a certain amount, and in some sort produce an internal hemorrhage. Did the flooding depend upon the rupture of some of the vessels of the placenta or cord, it would be characterized by causing the sudden death of the fœtus, and by debilitating the mother secondarily. Moreover, it would doubtless produce, as in cases where the blood is effused into the interior of the membranes, a feeling of weight in the pelvis and hypogastrium, with dragging in the loins, the groins, and about the pit of the stomach.

873. *Prognosis.* The dangers that follow in the train of uterine hemorrhage necessarily vary according to a multitude of circumstances, according to the species and amount of the flow, the stage of the pregnancy, and the ability of the prescribing attendant. In the early stages of pregnancy it is rare for the woman not to be saved, for abortion is nearly an invariable consequence of it. In the last three months, on the contrary, the life of the child is pretty frequently preserved, while that of the mother is exposed to much greater risks. Upon this subject it may be established as a general rule, that for the woman, the danger is the greater as the pregnancy is the more advanced, and that the converse is true in respect to the child. External hemorrhage is always less redoubtable than internal; because in the latter, the evil, when discovered, is often beyond the resources of art, while it is easy to recognize the former from its very commencement. Where the flow takes place from the cord or placenta, the life of the fœtus is more seriously menaced than that of the mother, and *vice versa* as to uterine hemorrhage, properly so called.

The danger is not to be estimated by the quantity of blood that is lost, but rather by the effect produced by it upon the system in general. There are women, who, other things being equal, are led to the verge of the grave by the loss of a pound of blood, while others lose double or triple the quantity without being seriously incommoded by it; and it is not requisite for me to say that

those who are strong, sanguine and robust, suffer from it less than such as are lymphatic, weakly and anemic.

874. Even although we should be so fortunate as to allay the storm, and prevent the death of the patient in a case of profuse flooding, there would still be reason to dread relapses that would become more and more dangerous, general or local infiltrations, chronic inflammations of the womb, peritoneum, pleura, and pericardium, and nervous affections of all sorts; as to the dangers of the moment they are estimated by the severity of the symptoms under notice at the time. While ever the debility is not great, while the pulse retains some strength and hardness, and the colour of the skin and features of the countenance remain without any too evident alteration, the flooding need not excite our alarm; on the contrary, there is not a moment to lose where the face grows pale, the extremities become cold, the sight dim, the pulse weaker, tremulous, and irregular; finally, but little hope remains where lipthymia, syncope and convulsions supervene.

875. Notwithstanding that the death of the fœtus is one of the ordinary consequences of hemorrhage occurring in the four or five first months of pregnancy, and that at later stages it becomes most generally necessary to empty the uterus, it would, however, be wrong to conclude that a happier termination of it can ever be obtained.

Indeed, all observers have remarked that slight floodings, especially those occurring in the first stage of pregnancy, when arrested by a well-understood mode of treatment, sometimes permit the ovum to continue its evolution, and the fœtus to live and grow until its natural term; the blood has been seen to flow even to the extent of exciting fears for the woman's life, and yet abortion not to take place (460); I attended a young lady who was seized with a profuse hemorrhage in the third month of her second pregnancy, who lost more than two pounds of blood in the space of thirty-six hours, and notwithstanding did not miscarry; M. Désormeaux mentions another case, where the blood flowed with such force that it was necessary to have recourse to the *tampon*, and where the pregnancy, nevertheless, went to its full term.

876. Uterine hemorrhage is cured in three ways.

1. The blood that escapes externally sometimes becomes itself the remedy of the evil it constitutes, disengorges the uterus, destroys the *molimen*, removes the congestion, and permits the equilibrium to establish itself naturally; here, the flow may have been effected at the expense of the cervix, the vagina, or the inferior portion of the womb, and may not have destroyed the principal adherences of the ovum, which remains uninjured, and thus is but slightly disturbed in regard to its development; or the placenta, although partially detached by the blood that exudes from its ex-

ternal surface, continues to resist, the hemorrhage stops, and, as in the other cases, the child's life is preserved.

2. In other cases, the flooding, after it has continued for a longer or shorter time, ceases; the ovum, although detached and more or less altered, is not expelled, and remains in the uterus for a period that is variable.

3. It most frequently happens that the contractions of the uterus are brought into play, and in these cases, we can rely only upon abortion, delivery, turning, or the forceps, to save the patient from dangers with which she is threatened.

Puzos has maintained that, when the flow is once arrested, the parts may contract new adhesions: a case by Noorthwyck, that of his own wife, has been supposed to confirm this opinion; but upon careful reflection, numerous doubts soon occur to any impartial and unprejudiced mind as to the value of this fact.

According to Pasta, whenever the union of the ovum with the womb is destroyed by the flow of blood, it is impossible for it to be re-established, and when abortion, or labour, or at least the death of the fœtus, does not follow flooding, it is because the hemorrhagic excitement takes place in some part beyond the limits of the placenta.

877. The following is what observation has demonstrated: while the blood is endeavouring to glide towards the os uteri, a more or less extensive portion of the placenta or anhistous membrane becomes fully saturated with it: first one clot forms, then a second, then a third; and these several layers, of various thickness, soon become sufficiently numerous, provided the energy of the hemorrhagic affluxion becomes diminished, to exert such a degree of pressure as to retain the blood within its own vessels; it is not by stopping up large openings, by filling large vascular trunks, but by being plastered against the pores of the womb, that coagula are enabled to suspend a hemorrhage; the same mechanism by which they succeed in putting a stop to epistaxis, when they accumulate within the cavities of the nose.

878. Provided these coagula are not very extensive, the ovum continues to live, like a tree from which one or more of the roots have been removed: the fluid part disappears by means of imbibition, and the fibrinous layers becoming drier and drier, and less and less evident, remain, sometimes, until labour takes place, although the points which they separate are not re-united. At the *Maternité* at Tours, I saw a young woman who was thrice seized with slight flooding, at intervals of a fortnight, in the last two months of her first pregnancy. There was nothing peculiar in her labour; but there were found on the surface of the placenta, three distinct layers, about the size of a three livres piece; one of these layers, which was very near the edge of the placenta, was composed of a clot that was still red, of a lenticu-

lar shape, and with difficulty separable from the after-birth ; the second was composed of a fibrinous concretion, much firmer and scarcely coloured at all ; the third looked more like a sort of cicatrix. Is it not evident that these three points corresponded to the seat of the three hemorrhages that had taken place antecedently to the occurrences of the labour ?

879. *Treatment.* It may be said with truth that the uterine hemorrhages of pregnant women, are diseases which require, on the part of the practitioner, the greatest coolness, knowledge and skill ; indeed, in presence of such accidents, a few seconds, more or less, often decide as to the life or death of two beings, equally dear ; such are the cases where it imports us to know how to choose the remedy and apply it properly, and where a distrustful timidity might become equally fatal with imprudence and rashness.

The means to which we can have recourse are extremely numerous ; some of them are, to a certain extent, applicable to all cases indiscriminately, and others are to be employed only under peculiar circumstances.

880. Rest, low diet, a horizontal posture upon a hair mattress, rather than upon a feather bed, in a chamber which ought to be darkened rather than too much lighted, quiet and not noisy, cool and well ventilated, rather than hot and close, with diluting or cold acidulous drinks, very frequently suffice when early recourse is had to them, in moderate cases of hemorrhage ; if the woman is strong or sanguine, and especially if there have been precursory symptoms, if there are rigors, and the state of the pulse warrants it, six or eight ounces of blood may be drawn from the arm. When these slight succours do not succeed at once, and where there has been no precursory *molimen*, and the woman is naturally weak, we have recourse to revulsives, and to external refrigerants. We prescribe manuluvia, either simple or containing mustard, dry friction of the arms, the breast and along the spine ; and apply large cups to the breasts ; aspersions are made upon the abdomen and inner part of the thighs, with cold water, either alone or with the addition of vinegar, ether, or ammoniac, &c. ; compresses wetted with the same liquids, or with iced water, may also be applied to the same parts. Burns praises the effect of alum ; Duncan and Rigby seem to have derived great advantages from the use of opium and sugar of lead (acetate of lead), which had previously been recommended by Ettmuller, &c., and is frequently employed by Dewees ; the digitalis is also recommended by many of the English physicians ; but these various articles are rarely made use of in France. Rhodion, Hamilton, and some others have recommended the application of tight ligatures to the limbs. A practice that seems to me to deserve the attention of practitioners is the application of a sinapism between the shoulders : I have made use of it often enough, and in cases sufficiently various to enable me

to affirm that it is one of the most powerful and most useful revulsives that can be recommended. MM. Trastour, Larouche, Nivert, and several young physicians who had seen me employ it, or put it in practice themselves, have already made mention of it in their theses. I have elsewhere stated the anatomical and physiological considerations by which I was led to its employment. I resort to it both in the first months of pregnancy and during labour, as also in the interval betwixt these periods; and the effect has always been extremely prompt. A young woman, nineteen years of age, was brought to the *Clinique Externe* of the School of Medicine towards the close of 1825; she was about three months gone with child, and had been flooding for twelve hours; we tried the remedies indicated higher up, but the flow continued nevertheless to increase until evening; being then alarmed by her extreme weakness and the appearance of approaching syncope, I applied a mustard cataplasm to her back; in a quarter of an hour the diminution of the hemorrhage was evident; it soon became a mere draining, which continued until the next day, when the ovum was expelled.

There ought to be nothing surprising in such a result, when we reflect with what ease people in the country sometimes put a stop to epistaxis, by placing a key, or some pieces of linen, or the like, wetted with cold water betwixt the shoulders, and with what rapidity sympathetic irradiations are brought into play by the action of mustard. Nevertheless, it would be unreasonable to think that the action of this medicament is infallible, and that it ought to be employed in all cases. Reason indicates that it would be injurious rather than useful where the flooding is attended with a general reaction of the system, and the symptoms of the hemorrhagic effort continue in full force; both in pregnancy and during labour, as the placenta is to a great extent detached, and its expulsion is inevitable, it might serve to diminish the impetuosity of the affluxion; but there would be little wisdom in relying upon it to completely suppress a hemorrhage that had already become serious and alarming.

881. The *tampon*. Doubtless one of the first ideas to occur to the mind upon observing a flow of blood from the womb, was to stop up the orifice of that organ; however, notwithstanding what Costa says upon the subject, the use of the tampon was hardly mentioned in the science until since the times of Madame Bourgeois, of P. Portal, F. Hoffmann and Smellie. If we may confide in Leroux, the tampon is an heroic remedy, which is almost always followed by success; according to the modern classics, on the contrary, it is rarely an useful and most frequently a dangerous remedy, that ought to be proscribed from sound practice. Amongst others, M. Demangeon, who has been well combated by M. Gardien, has expressed himself strongly against the tampon,

which, in his opinion, can only serve to augment the dangers of the disease. Rigby and Merriman scarcely make mention of it. Specious arguments, theoretical prejudices, exceptional cases generalized, and false reasonings, comprise, notwithstanding, all that has been brought to bear against the innumerable facts that have been reported by an infinite number of authors: in fact, it is not possible, after reading the work of Leroux, to participate in the fears that are attempted to be awakened by the antagonists of the tampon, or in common with Burns, Mesdames Boivin and Lachapelle, and Dr. Dewees, not to consider it as one of the most powerful means of rescuing women from the dangers of a serious attack of flooding.

882. It ought not upon this account to be said that it never can be injurious. The tampon, like all important therapeutic resources, is a weapon of protection in the hands of a skilful practitioner, but it may become a murderous one in those of an ignorant person. For example, it would be imprudent to make use of it at the commencement of a flooding before the symptoms of plethora have been dissipated, or where the blood is being effused within the interior of the membranes with the uterus in a state of inertia; for in such a condition it could not fail to augment the excitement, or by retaining the blood in the womb, favour the indefinite distension of the parietes of that organ. Nevertheless, it has not as yet been very positively demonstrated, that even here it would not be more frequently useful than hurtful; reasoning, which accords with a pretty considerable number of facts, leads me to believe, along with M. Chevreul, that it affords, perhaps, one of the surest means of forcing the uterus to contract or arouse it from its lethargy; this is the property, even, which renders it redoubtable where we are fearful of facilitating the expulsion of the ovum, and which makes it improper to resort to it until after we have ascertained the inefficacy of other modes of treatment.

883. It is composed in very various ways: many persons content themselves with filling the vagina with tow, lint, old linen, sponge, &c. Dewees says it is never necessary to carry the tampon as far as the os uteri; there are some who prefer a small bag, or sort of purse, filled with astringent substances: but the simplest method, which also is that adopted by M. Désormeaux, consists in making a kind of sac with fine linen well greased with cerate, and which is introduced empty as far as the os tincae, to be afterwards filled with little rows of lint or tow, or some such substance, and then secured with a T bandage. The oil in which Burns advises us to soak the tampon appears to me to be of no other use than to favour its introduction. Vinegar, and oxycrate, recommended by others, are of less doubtful value, although their styptic action is soon annihilated by the coagula, and by the flow

of the blood ; moreover, it is a mechanical barrier and not a pharmaceutic substance by which we attempt to oppose the hemorrhage. It is a real stopper, which, by closing up the passage to the blood, compels it to coagulate by little and little, and as it becomes concrete, to compress and shut up the exhalant orifices that furnish the fluid ; on the other hand, by its quality as a foreign body, it excites the cervix, and changes the vitality of the womb, whose contractibility it arouses, whose reaction it recalls, to such a degree as soon to occasion the expulsion of the ovum.

If it is to succeed, the blood ceases to flow from the vulva, the general symptoms are gradually allayed, the hypogastrium becomes more firm without increasing in size, and provided the womb is not to be emptied, the woman only experiences a feeling of tenesmus, straining and weight in the pelvis, and sometimes slight colic pains ; while, in the opposite case, pretty smart pains, and real contractions of the womb supervene ; in consequence of which the clots, the tampon, and the product of the conception are all expelled one after another from the genital organs.

In some women it is followed by such a degree of uneasiness, even although there may be no uterine contractions, that they insist upon its being removed ; in general, their entreaties should be resisted, provided no evidences of internal hemorrhage are discovered, unless, indeed, the pain is so acute as to give rise to certain nervous affections, or convulsions ; complaints in these cases are rather to be desired than feared. After some time the functions are seen to return to their natural state ; and, in order to avoid the risk of a return of flooding, the tampon is left *in situ* as long as possible, at least for several hours, or even a whole day ; then, when it is no longer considered to be indispensably necessary, the T bandage only is removed, for the tampon ; being no longer kept in the organs by an external force, it escapes spontaneously and gently.

884. *Dilatation of the os uteri, and rupture of the membranes.* Before proceeding to forced delivery, Puzos recommends the trial of a practice which is, in his opinion, much more simple, and particularly much more consonant to the nature of the organism ; introduce, says he, first one, then two, then three fingers into the orifice, which you should titillate and irritate, but very gently ; and you will often find that this alone will suffice to stop the hemorrhage, and to induce the womb to contract. If this does not suffice, begin to dilate it, enlarge it with all the care and gentleness that the severity of the symptoms will admit of your using, and if you still do not succeed, perforate the membranes, and the vacuum that will take place in the membranes will rarely fail to be followed by the expulsive contractions of the womb. You will have, it is true, a premature delivery, but which will be less

dangerous both to the mother and to the child than if the practitioner had undertaken to deliver the fœtus.

885. This conduct is particularly adapted to cases where hemorrhage takes place during labour, or where the pregnancy is very much advanced, and the placenta is not attached near to the neck. Notwithstanding, it is evident that with the exception of the rupture of the membranes, the tampon fulfils pretty nearly the same indications, and that where the flooding is violent it would be wrong to act with so much reserve, and not to terminate the delivery as soon as possible.

Forced delivery. When a labour proceeds with a certain degree of regularity, notwithstanding the hemorrhage may continue, and the powers of the woman may diminish too rapidly, it generally suffices to accelerate the contractions as has been mentioned, and to engage the woman to keep up her courage and use her best efforts to enable the womb to get rid of its contents as well as to put a stop to the flooding. Provided, on the other hand, the infrequency of the pains does not permit him to rely upon the powers of the economy, the accoucheur should hasten to deliver the child. If the head be already engaged in the superior strait, and the os uteri sufficiently open, and *à fortiori*, if it have already reached the excavation, it should be seized with the forceps; otherwise the child should be turned; but in order to admit of the hand being carried into the womb, the orifice must have reached a certain degree of dilatation, or at least be in a very dilatable state. Therefore it is only in the last stages of pregnancy, and where nature or the means heretofore pointed out have forced the labour to begin, that we may resort to this method, which is particularly applicable to cases of hemorrhage from implantation of the placenta over the cervix uteri. Happily, when there is a flooding, the orifice is commonly very soft, and admits of a ready passage. Moreover, it is manifest that where the danger is pressing, it would be better to make use of some violence in overcoming the resistance, than to abandon the woman to the so frequently fatal chances of an overwhelming flooding.

886. The termination of the labour should never under any pretext, be left to the powers of nature, when the hemorrhage is incontestably occasioned by the insertion of the placenta upon the os uteri.

In this particular case, many practitioners have recommended, that as soon as the fingers have got within the os uteri, we should try to find that part of the edge of the placenta that is nearest, so as to pass up the hand in that direction; others have thought that in difficult cases, or where there is no time to temporize, it would be better to neglect this minute research, and to perforate or rupture that point of the ovum that corresponds to the orifice, so as instantly to lay hold on the child's feet. The former of these two

modes of practice would occupy too much time ; and the latter would not fail to augment very greatly the violence of the hemorrhage, and seriously endanger the life of the fœtus, should its extraction happen to be tedious or difficult. Besides, the child would have to be withdrawn through the opening in the placenta, which, being pulled downwards by the shoulders or head, would necessarily raise great obstacles to the operation.

The method followed by P. Portal, M. Dubois, &c., is in all respects to be preferred. Without any regard to the edge of the placenta, the hand, after reaching the os uteri, is to be first carried in front, and then to the right of the woman if it be the left hand, and to her left if it be the right hand that is made use of, and in less than a second, the membranous part of the ovum is reached, and must be perforated ; the feet are now promptly seized, and the fœtus may be delivered before the after-birth.*

887. In the other species of hemorrhage, when the turning has been effected, and the hips are at the vulva, it seems to be wise, provided there be no inertia of the womb, to leave the closing of the labour to nature, whereas, in cases of implantation over the cervix, when the operation is once begun it cannot be terminated too soon. The reason of this difference strikes us at once : in the first-mentioned case, as the omphalo-placental circulation continues to go on, the life of the child is not compromised, and that of the mother is no longer in danger as soon as the blood ceases to flow ; in the second, the functions of the placenta ceasing, a few moments of delay might occasion the death of the fœtus.

Is it necessary for me, in closing, to state that the reader must look to the articles on abortion and delivery of the placenta for the details which I cannot introduce here ?

§ II. OF CONVULSIVE DYSTOCIA.

The agitation, the agonies of a woman in the midst of the most violent labour pains, are sometimes carried to such an extent, that to have been witnesses of them is sufficient to make us feel that such a state borders closely upon the convulsive affections, and convince us that convulsions must be frequently met with in women in labour.

The convulsions of pregnant women, like those of other women, may be general or local ; affect only one or all the limbs ; the face or any other part separately ; or they may bring into play all the muscles of the life of relation : most commonly none but the mus-

* I saw a patient in labour with placenta previa, under the care of Dr. R. M. Huston of this city. The hemorrhage which had been very great was arrested before my arrival, by means of a *tampon*, which he introduced. In the mean time the pains continued to dilate the os uteri more and more until, inferring that the organ was sufficiently dilatable, he removed the tampon, and then successfully delivered by turning.—M.

cles that are habitually subject to the will are affected; but in certain cases, those viscera which contain a muscular membrane are also seized. Thus the pharynx, the œsophagus, the stomach, the intestines, the bladder, the uterus itself, the heart, and especially the diaphragm, are at times violently tormented by them.

Hysteria, epilepsy, catalepsy, and the convulsions produced by some material lesion, such as a phlegmasia, or any disease of the encephalon or its meninges, or of the general nervous system, appear pretty frequently, and sometimes become aggravated during the course of pregnancy: but it is to be observed that the three first rarely manifest themselves during labour. Moreover, in these cases the *disease* is complicated by the state of gestation, and that is not what is generally understood by the convulsions of pregnant women.

888. Puerperal convulsions, also called *apoplectic* convulsions, *hysterical apoplexy*, *milk apoplexy*, *sympathetic apoplexy*, *eclampsia* of labour, differ from other diseases, in which they are evidently connected with the state of pregnancy which they complicate.

889. Their *proximate cause* is always located in the brain, and consequently, I do not perceive the use of dividing them into sympathetic and idiopathic convulsions. This proximate cause doubtless, is an irritation, or stimulus, which reacts upon the whole nervous system, but whose nature appears to be extremely variable; sometimes it is a precedently irritated point in the brain which invites the fluids into that organ, which thus becomes a centre of fluxion; sometimes, on the contrary, the fluids themselves, by being determined towards the brain in too large quantity, produce a state of congestion therein, and in consequence thereof, a convulsive reaction. In this, as in the other case, the remote causes are very numerous. There are predisposing and determining causes. Although eclampsia is observed at all seasons, at every age, in all classes of society, and under all temperatures, it is, notwithstanding, true to say, that strong persons, those who are plethoric, of a dry fibre, very animated countenance, short neck,* abundantly and frequently regulated, nervous, delicate, irritable, subject to *nervousness*, and young women in the first pregnancy are more liable to them than others.

Air that is impure, charged with odours, and too rarely renewed; the summer heats, too high an artificial temperature, anger, grief, vexation, some unexpected news, joy, and all the vivid emotions; loss of sleep, frequenting of balls and theatres; labouring at night;

* In Dr. Collins' cases, amounting to 16,654 labours, there were 30 cases of convulsions. Five of the women died.

In all the cases of convulsions that have come under my notice, the women were small, thin, with long necks. I have seen only one fatal case. It has been my good fortune to have met with few samples of this dreadful malady.—M.

the abuse of baths ; of hot drinks, of coffee, tea, spirituous liquors, and spiced or high-tasted dishes ; a succulent regimen, and whatever increases the afflux of blood towards the head ; the presence of a great quantity of water in the membranes, or of several children in the womb ; rigidity or extreme sensibility of the fibres of that organ ; hardness or spasmodic contraction of the neck of the womb ; the pressure which it exerts upon the surrounding vessels and nerves ; the thrusting of the stomach upwards ; coition ; the suppression of an issue or any habitual discharge ; the use of corsets, and too tight dresses ; and want of exercise, &c., have been ranked among the causes of eclampsia. To these have been also added, infiltration of the limbs or leuco-phlegmasia, living in hot countries, indulging in too much sleep, leisure, the use of alcoholic elixirs and tinctures ; the habit of lying long in bed, atmospheric vicissitudes, and almost all the common causes which the authors never fail to recall upon the occasion of each disease they describe, those causes which seem to produce all the evils because they do not necessarily create any one of them.

890. No one can deny that such circumstances have sometimes produced eclampsia ; but it is also undeniable that it often comes on without its being possible to assign any satisfactory reason for it. Convulsions appear most commonly towards the end of pregnancy, and their most common occasional cause is labour ; they may then depend upon some obstacle which, by obstructing the escape of the fœtus, soon produces a general disturbance of the system ; or upon a simple irritation that re-acts upon the whole economy ; or, also, a repulsion of the fluids towards the interior of the body, occasioned by the efforts which the woman is compelled to make. They may also be the consequence of an attack of hemorrhage, or of exhaustion, or the symptoms of some rupture, &c. Many practitioners, among whom are M. Désormeaux and Madame Lachapelle, have observed that eclampsia sometimes prevails almost epidemically. “When one of our women had been seized with convulsions, we rarely failed,” says Madame Lachapelle, “soon afterwards to have several others in the same state.” A tendency to imitation would be here insufficient to account for the fact, and, besides, could not be applicable to cases occurring out of the public establishments, in private practice, or in those singular epidemics that have been so often observed.

891. *Signs.* The attack of eclampsia is, in some women, announced by various precursory symptoms, such as flushes of heat about the head, giddiness, confusion of ideas, hallucinations, indisposition to move, *uneasiness* in the limbs, a dull or frightened look, redness of the conjunctiva, or of the whole countenance, headache, vertigo, stammering, vivid brightness of the eyes, irregularity of the pulse, slight convulsive motions of the muscles of the face, subsultus of the muscles of the extremities ; but it is

often, also, found to appear in a sudden and unexpected manner, and to attack at once, with the most alarming symptoms. The woman suddenly becomes insensible, and seems to revive for a moment only to fall again into the most violent agitation; the limbs writhe, contract, become flexed and extended with astonishing strength and celerity; the body is bent backwards, as if the head and heels were about to approach each other; the hands are powerfully directed towards the breast or the epigastrium, which they strike, and sometimes appear to tear with rage; the features of the face become distorted and *convulsed*; the lips, which are drawn in various directions, move in the most singular manner; the eyes roll, are agitated and turned up under the orbits; the pulsation of the carotids and temporal arteries is seen through the skin; the jugulars swell; the throat and face become tumid, and almost purple; the eyes seem as if they would start out of the head; the mouth fills with water, which is spirted sometimes to a great distance upon the assistants; the tongue, irregularly agitated, is often pinched, and even violently bitten by the grinding of the teeth and the spasmodic motions of the jaws. In these terrible moments the woman is truly a frightful object, and highly deserving of pity; the diaphragm by its rapid contractions gives rise to sobs, and an appearance of suffocation, and forces from the mouth and nostrils the substances accumulated in them. The stomach and bowels, the bladder and uterus itself, when they become the seats of such motions, produce vomitings, involuntary expulsion of the feces and urine, and sometimes of the ovum, with an extreme promptitude; in fine, it might be said that all the viscera participate in the disordered movements of the limbs. At other times, the face and rest of the body pass, so to speak, with the rapidity of lightning, from this state of agitation and vivid colour into the most perfect calm, and fall into a mortal paleness; at last, and more or less promptly, the congestion of the brain brings on coma, which generally succeeds the attacks of syncope and insensibility.

892. The duration of an attack is not less variable than its intensity; it lasts in some cases only from ten minutes to a quarter of an hour or half hour; whilst in others it continues half a day or even twenty-four hours; if coma supervenes, it may prolong the insensibility for several days and terminate in a complete and prompt restoration to health; but it is also found to assume all the characters of apoplexy, and occasion the death of the patient. It also sometimes happens that certain of the functions remain in a perverted state after the cessation of the convulsions; sometimes the sight, or hearing, or smell, or some one of the intellectual faculties appears to have suffered the severest pressure of the disease; at others, there are found internal lacerations or particu-

lar effusions, that occasion a deviation from the natural state of the organism, &c.

When the woman comes to herself, fatigued and worn out, her limbs bruised, as after long and violent exercise, astonished at the situation in which she finds herself, she is, sometimes, ignorant of every thing that has taken place, can scarcely believe what is told her, and has no knowledge of the extraordinary movements executed by all parts of her frame, or the violent cries she has uttered; some are mentioned, even, who have been delivered without knowing it, and after the attack was over could not understand that they were really delivered!

On the parts that have been struck with considerable force we afterwards find blackish spots, which are real contusions, attended with more or less pain.

Where the woman recovers her senses in the intervals of the paroxysms, the convulsions have been denominated *epileptiform*; in the contrary case, and especially where they are accompanied with stertor and coma, they are called *apoplectiform* or *eclampsic*. This division can be of use no further than this—viz., that the former which are more easily confounded with epilepsy or hysteria, are rarely so dangerous as the latter; but in fact they are only different shades of the same affection.

893. The examination of the body after death is far from always giving a satisfactory explanation of the severity of the symptoms. A small quantity of serum in the ventricles of the brain; the veins and sinuses of the brain more or less engorged; the meninges and cerebral substance somewhat red, or of a natural appearance; in some cases evident traces of congestion, or a slight extravasation of blood; but, most generally, no appreciable lesion is what the unprejudiced observer finds within the cranium. Neither have the other splanchnic cavities exhibited any alterations, that constantly occur in these cases; the heart is flaccid and almost empty; the lungs choked up or pale; a few ounces of citron-coloured or reddish serum in the serous cavities, are the principal traces left by the disease in the abdomen and thorax.

Without being rare, eclampsia is, notwithstanding, not a disease frequently to be met with, since Madame Lachapelle met with it only sixty-five times in nearly forty thousand pregnant women; the prognosis is in general unfavourable, for by the admission of that lady, in spite of the most rational and careful treatment, one-third of the cases proved fatal. It is more frequent in the last three months and during labour than at other periods, and is less dangerous when it occurs after delivery, or previously to the sixth or seventh month of gestation. Not so serious, *cæteris paribus*, when occurring during labour, as before it, it is less so in proportion as the labour is more advanced at the moment of the first attack.*

* I am of opinion that convulsions are more to be feared in labour where

As the emptying of the uterus is often the only means of putting an end to the convulsions, it is evident that the danger arising from them will be in a direct ratio to the difficulty of effecting that object; if the neck of the womb and the head of the fœtus are disposed in such a way as to make it an easy matter to extract the child, the disease may be considered as less alarming than if the orifice is still hard and undilated. Those cases that attack women who are hysterical, epileptic or endowed with great nervous susceptibility, or whose form exposes them more particularly to these two affections; those in whom the paroxysms are short, or separated by well-marked intervals of calm, and of restoration of all the functions, are always less to be dreaded than such as possess no analogy with an anterior nervous state of the woman, which supervene in women who are sanguine, plethoric, or whose organs are all surcharged with serosity; which are accompanied with apoplectic phenomena, as coma, stertor, or complete insensibility during the intervals of the paroxysms; and also of such as are only the symptoms of organic disease of longer or shorter standing, seated in the brain, the lungs, the heart, or any other important organ, and which had been greatly aggravated by pregnancy.

894. The child runs scarcely less risk than the mother; in the first place, it often dies in the midst of the extraordinary motions that mark each paroxysm; and then, wherever abortion takes place, its life cannot be preserved; the same thing often takes place when premature delivery cannot be avoided; and even in forced delivery also, at full term, the fœtus is often lost; nevertheless it is incorrect, with some authors, to state that the loss of the child almost always occurs where the attack of puerperal convulsions is somewhat severe. Mauriceau, De la Motte, Levret, Smellie, Baudelocque, the cases gathered or collected by MM. Bouteilloux, J. C. Baudelocque, Madame Lachapelle, &c., afford proof enough of the contrary.

895. *Treatment.* A disease exhibiting itself under forms so diverse, and in such various degrees, cannot be cured by a treatment that is alike in all cases: it is therefore not astonishing that we have so many boasted remedies for it. There are few substances among the antispasmodics, the sedatives, the narcotics, the revulsives and the antiphlogistics, which have not had their

the pains are violent, but ineffectual, than in those where the pains are feeble and of short duration. The violent efforts of the abdominal muscles in consent with the energetic contractions of the womb, and the strain upon the respiratory organs in the bearing-down, cannot but press the uterine globe very strongly against the aorta, and the great arterial trunks in the belly; hence an increased determination of blood to the head. Hence the swollen and flame-coloured countenance, the extraordinary activity of the innervation; and lastly, the convulsive attack. Hence, too, an additional motive for emptying the womb as soon as practicable, in order to obviate one of the causes which having produced, will, if unchecked, continue to aggravate the cerebral causes of the convulsion.—M.

vogue ; but as there is always too much disposition to generalize, in therapeutics as well as in the other branches of medicine, facts have not been wanting to prove that such or such an article, pulled beyond measure by different physicians, is more injurious than useful in eclampsia.

Ether, balm water, orange-flower water, and mint water, mixed in various proportions with infusions of linden flowers, wild poppies, orange leaves, lettuce water, &c., and with some sedative syrup, are not to be neglected in a number of cases where the convulsions have more analogy with hysteria or epilepsy than with apoplexy, especially if the patient is nervous, very excitable, or lymphatic rather than plethoric and sanguine.

In these cases, also, the syrup of clove pinks, of white poppies, of diacodium, pills of cynoglossus, the extract and tinctures of opium, may be usefully given, either alone, or added to the above-mentioned vehicles, or under some other form, and combined in some other manner.

896. Rigidity, scirrhus induration and spasmodic contraction of the os uteri being sometimes the only, or at least the principal cause of convulsions, we ought not to omit to examine it carefully. Provided that it should seem to be the point of departure for the disease, we should apply to it some of the opiate cerate, from which M. Schweighaeuser asserts that he obtained very successful results, or what is better still, the belladonna ointment. Were it really too hard to be overcome by the efforts of the womb, I do not see that it would be possible to dispense with incising the neck. Upon this subject the fears of Madame Lachapelle are, to say the least, exaggerated : for I have not learned that the passage of the head, after this operation, has in any case enlarged the wound, so as to perforate the peritoneum. However, notwithstanding what has been said by M. Bodin, it is a resource not without danger, to which we should not under any pretext resort, except in case of indispensable necessity.

897. Bleeding has always enjoyed much favour among obstetric physicians : Mauriceau, De la Motte, Puzos, &c., have repeated it six, eight, ten, seventeen and even as many as eighty-six times in one pregnancy in the same woman? The loss of blood is always useful where there are signs of congestion about the head, a strong pulse, or any signs of plethora. The blood is sometimes drawn from a superficial vein, sometimes by means of leeches or cups, and at others by all these means together. Except where there is some particular counter irritation, we commonly begin with a general bleeding of six, eight, ten, twelve, or even fifteen ounces, according to the severity of the disease, and the constitution of the woman. After this first venesection, if it appears to produce some amelioration, it is repeated a second time, a third, or even a fourth, at intervals more or less considerable,

always remembering that in this way the strength of the woman is rapidly exhausted. When the general bleeding can no longer be repeated with the hope of obtaining any decided advantage from it, leeches may be applied to the number of fifteen, twenty, thirty, forty, or fifty, behind the ears, or on the neck, or even in the neighbourhood of the vulva, provided there should be any appearances of irritation or evident congestion in the pelvis. Should the coma be very profound, and blood not to be got except in very small quantity, scarified cups on the nape of the neck, or on the mastoid apophyses, ought also to be tried. As to bleeding from the temporal artery, or even from the radial artery, proposed by some persons, I do not think that it deserves any preference over venesection: but which vein ought to be opened?

In the prevailing theory of blood-letting bleeding in the foot passes for being essentially revulsive, while bleeding from the neck is rather derivative, and that from the arm merely depletive; but these distinctions are scarcely justified by practice: Baudelocque has seen bleeding from the saphena aggravate the affections that were invariably diminished by opening a vein in the arm, and other practitioners have observed the inverse. In eclampsia the object is to disengage the vascular system, and when bleeding is deemed necessary, I think it matters little whether it is taken from one vein rather than another. If the cerebral congestion is fixed and too great, should the opening of the jugulars appear to be indicated, leeches or cupping might be regarded as preferable, considering that bleeding in the neck is not always an easy nor even practicable matter, especially in a person labouring under convulsions.

Another reason of the same kind will long continue to render bleeding in the arm much more general than bleeding in the foot; it is always, or most always possible, no matter how agitated the patient may be, for us to open a vein in the bend of the arm, whereas as much cannot be said as to the veins of the legs: by bleeding in the arm, we act at the instant, when we please, and how we please, and we take much or little, and that without any difficulty. By bleeding in the foot, on the contrary, various preparations are required; we must take advantage of a moment of calm, the vein is often found to be too small or too deep-seated, and it frequently happens that enough blood is not obtained.*

* M. Velpeau does not dwell with sufficient emphasis upon the use of blood-letting in these convulsions. In this country the amount of blood drawn for the cure of puerperal convulsions is determined only by the ability of the patient to bear its loss—I should be more pleased if M. Velpeau should recommend instead of 15 ounces, the abstraction of 20 or 40 ounces; for, whatever may be the cause of the attack, it is attended with so great a determination to the brain that no time should be lost in reducing it by the promptest mode, *videlicet*, by blood-letting.—M.

898. Tepid baths allay irritation, whether sympathetically by their soothing action on the skin, whether by diminishing the exciting qualities of the fluids by the water which they occasion to pass into the circulatory system, or by diminishing the force of radiation of heat. They are administered with success where the symptoms of apoplexy do not predominate; but they ought not to be prescribed until a bleeding has been premised, provided the state of the patient is such as to admit of her losing blood without danger; otherwise it might favour the affluxion and congestion in the brain; they should be rejected in cases depending on flooding, a serious plethora, and where there are any threats of inertia: the woman may remain immersed in a bath for half an hour, an hour, or even longer, according to the relief she derives from it.

899. The application of *cold water* to the belly, according to the recommendation of Sigaud, has not a sufficient number of facts in its favour to enable us to recommend it in this form as a general proposition. Ablutions, and ice-water to the head, either used alone, or whilst the rest of the body is plunged into a hot bath, which Denman and most of the English authors, as well as M. A. C. Baudelocque, Madame Lachapelle, &c., have boasted so much of, appear as if they might indeed be usefully combined with the other rational means where there is reason to fear a lively reaction in the brain; nevertheless their employment seems to me to require a great deal of prudence and circumspection.

900. *Oily or irritating* injections of all sorts are frequently used in England, and not without success. In France, they prefer external revulsives, sinapisms or sinapised cataplasms, to the feet, legs or thighs, a large blister on the back of the neck, and dry frictions along the spine, and on the limbs. Madame Lachapelle, who does not place much confidence in them, and is even afraid of them where there is a threatening of inflammation in any one of the organs, also rejects the employment of digitalis and camphor, to which Hamilton attributes very great virtue, and blames the conduct of our transmarine neighbours, which consists in a recourse to purgatives and even to emetics, after bleeding. Without charging myself with the defence of the accoucheurs of Great Britain, I cannot, however, omit to observe, that out of twenty-two women treated by bleeding, calomel in purging doses, neutral salts given by the mouth or by injection, and lotions made with liquid acetate of ammonia or spirit of rosemary, to the head, Merriman lost only six, while in spite of the energy of the practice employed at the *Maternité*, they have almost as many deaths as cures in that institution.

The digitalis purpurea, which is recommended by Hamilton, may be tried in convulsions preceded by œdema of the limbs. The seton in the back of the neck, as advised by M. C. Baudelocque, ought not to be employed until all other remedies have

been found insufficient; moxas and scarified cups are not likely to be at all more successful than leeches and the common revulsives.

901. To conclude, bleeding from the arm, the foot, or the jugular vein, is useful, and often times even indispensable, in the convulsions of pregnant and puerperal women, whether of a slight or severe character, where the patient is young, strong, and of a good constitution, and not exhausted by preceding hemorrhages. Local blood-letting is the only kind we can resort to where the convulsions supervene upon a flooding, or in persons who have been debilitated in any way, or those of a lymphatic constitution, &c. In that case, if they occur after delivery, and the lochiæ have ceased to flow, leeches may be applied to the labia or to the groin, as recommended by M. C. Baudelocque, otherwise they should be applied to the mastoid apophyses, according to the counsel of Chausseier.

When the vascular system has been depleted, if the state of the patient admits of it, a tepid bath should be prescribed; if irritation or spasmodic contraction of the os uteri appears to be the cause of the phenomena, some opium cerate, or belladonna ointment should be applied to it. After a flooding, or a painful or fatiguing labour or delivery of the placenta, some analeptic broths and a few spoonfuls of sound wine will occasionally be found the best remedies that can be made use of. Where the woman is delicate and nervous, we have recourse to sedative infusions and waters, narcotic preparations, &c. Sinapisms, blisters, scarifications and other revulsives are, in severe cases, particularly useful as accessory in effect to blood-letting, or as supplementary to those evacuations, where they are themselves inadmissible. Finally, should there be manifest symptoms of disordered stomach or bowels, without any of the signs of inflammatory irritation, I do not perceive that there would be any temerity in promoting either the vomiting or the alvine evacuations by means of gentle emetics and purgatives; but during the labour, the best remedy beyond dispute is the delivery of the child.

902. Where the disease comes on before the end of the sixth month, we ought to do every thing in our power to succeed without soliciting the expulsion of the fœtus, its viability being at a later period possible, there is no longer any need for so many precautions on this head.

To admit of the child being delivered, either with the hand or with the forceps, it is necessary that the dilatation of the cervix should be very advanced, or at least that the os uteri should be soft enough to admit of the womb being entered without the employment of any great degree of force. However, if a trial have been ineffectually made of ointments, injections and baths; if the woman or the child were in imminent danger, and a forced delivery the only means of safety; and in a case where the os uteri

should be thin, but hard and undilatable, and obstinately resist the contraction of the womb, there ought to be no hesitation in following the counsel of M. Bodin, to make one or more incisions into its concave edge, or in resorting to what has been called since the time of Simson and Lauvergeat the vaginal-Cæsarian operation.

§ III. DYSTOCIA CAUSED BY THE PREMATURE DESCENT OF THE UMBILICAL CORD.

903. Although not a rare occurrence, procidence of the cord is not very frequently met with, for it was observed to happen forty-one times in 15,652 labours, at the *Maternité* at Paris; its being more frequently met with in private practice seems to depend upon the hasty manœuvres of the persons who assist the lying-in woman, rather than any other cause: Black has even asserted, but it is evident erroneously, that the descent of the cord is always the effect of attempts to hasten the delivery. A woman was brought to my amphitheatre while I was delivering a lecture; she was compelled to wait half an hour at the porter's lodge; no one examined her, and when she was brought up to the ward, the cord formed a loop of several inches hanging out of the vagina, although the os uteri was but very little dilated. Moreover, there are but few accoucheurs in large practice who have not had several opportunities of observing the same thing.

904. The causes of this accident may be referred, 1. To the excessive quantity of the liquor amnii; 2. To too great a length of the cord; 3. To the too sudden escape of the waters upon the rupture of the membranes.

905. The procidence of the cord has always been noted by authors as a dangerous accident. Not because it renders the labour more difficult, or causes the woman to run any greater risk, but because the fœtus is thereby exposed to the hazard of dying before it can be delivered. Its death in this case is indisputably produced by the cessation of the circulation of the blood through the cord, and all the reasons collected in the memoir by Thouret are insufficient to weaken this proposition; but the obstacle to the circulation has not been understood in the same way by all accoucheurs.

Until the time of De la Motte, who did justice to this notion, it had been generally supposed that the blood, from becoming chilled by the external temperature, coagulated, or become concrete in the loop of the cord hanging out of the vulva.

At present, the accidents attending it are attributed to compression alone. In fact as soon as the waters are all gone off, if the cord descends before the head, the breech, &c., its vessels are almost necessarily flattened during the expulsive efforts. Nevertheless, if the pelvis be very large, and the fœtus small, and the

cord is placed near one of the sacro-iliac notches while the forehead or the occiput is towards the opposite one, the compression of its vessels may be so slight as not to prevent the blood from pursuing its route.

906. Death takes place from an excess of blood, or apoplexy, if M. Chambon is to be believed; from anemia or syncope, according to Baudelocque, MM. Capuron, Deneux, &c.; from asphyxia, or want of oxygenation of the blood, according to Muller. But neither of these three hypotheses is correct. It is impossible to maintain with Freteaux, that the vein is less compressed than the arteries, or with others, that just the contrary happens. All three of the vessels are compressed alike, and the death of the fœtus is to be explained not upon the quantity, but the quality of the blood, it receives.

907. *Prognosis.* If the cord is cold, without pulsation, shrunk, and greenish, the death of the child is indubitable; if the labour is still far from its termination, the head strongly engaged, and it is difficult to alter its position, the prognosis will be very unfavourable. On the contrary, if the pulsations are kept up with some degree of force, and the labour goes on rapidly, even although the cord be lank and shrunken, its premature escape may be followed by no unpleasant effect.

908. *Treatment.* There are different ways of remedying this procidence. If the child presents transversely, by the shoulder, or by the hip, and the os uteri be not sufficiently dilated to admit of an attempt to turn, we must try to return the loop into the womb; where the labour is pretty well advanced, we have to seek for the feet, and it would even be dangerous, whenever the pulsations of the cord are found to grow sensibly weaker, to wait for a complete dilatation before we act.

Where the pelvic extremity of the fœtus presents, as soon as the contractions become sufficiently strong, we have to favour their effect by pulling downwards in a proper way upon the lower extremities. But it is, particularly, where it escapes before the head that the cord requires prompt assistance.

In such cases the ancients confined themselves merely to pushing it up again, and keeping it wrapt up in a linen rag in the vagina; modern surgeons make use merely of their fingers, or of a piece of whalebone surmounted with a sponge or with a ring. Ducamp has recommended a species of pincers, enclosed in a canula, in most respects similar to the *porte-nœud* of Dessault; M. Dudan thinks we should be satisfied with a gum elastic catheter, No. 9, furnished with its wire, which serves to fix the end of a ribbon passed through one of the eyes of the instrument. With this ribbon M. Dudan sustains the cord at the end of the catheter without compressing it, and returns it into the cavity of the womb, where he afterwards leaves it, first withdrawing the

wire, and then the catheter itself. The canula à *charnière*, proposed by Wellemberg, would in fact be more dangerous than useful, and I doubt whether any accoucheur will be ever tempted to make use of it. It has also been advised to introduce and fix graduated compresses or bits of sponge betwixt the head of the fœtus and the parts of the mother. Finally, Mr. Croft finds it more expeditious and more safe to carry the whole hand into the womb, so as to hook the loop of the cord over one of the limbs of the child.*

Doubtless, most of these means might succeed; but there is not one of them that ought to be adopted exclusively; for the conduct to be pursued will necessarily vary according to the state of the circumstances.

909. When the child is dead, the presence of the cord requires no particular manœuvre. If it be living, the head may be, 1. Upon the point of clearing the inferior strait; and in that case we need only urge the woman to bear down upon the pains as hard as she can; 2. In the excavation, and the labour may go on but slowly; the reduction is here impossible, and if, after trying it, we find the pulsations of the cord diminishing, we must hasten to apply the forceps; 3. Lastly, scarcely engaged; here we take hold of the cord, and roll it up into a kind of ball which we endeavour to return by pushing it up by the side of, or even above the head, if possible, and if there is any tendency for it to fall down again, it should be kept there until the contractions have firmly fixed the cranium in the strait. Provided the introduction of the fingers were found too difficult, or insufficient, some mechanical means might be tried; such as the instrument of Du-

* I succeeded in a case of this kind three years since.

Upon examination, *per vaginam*, I found the membranes ruptured, and a large gelatinous cord presenting, a fold of which was just within the vulva. Further exploration satisfied me that the breech was presenting in the *first position* with the heels in contact with the nates.

The pulsation of the cord was strong, and as the breech had not entered the superior strait, I thought the position favourable for a successful manœuvre, and, accordingly, placed the funis between the index and second finger of the left hand, carried it up in front of the child, above its knees, and lodged it safely between them and its abdomen. In withdrawing my hand I carefully seized the feet, the toes in the palm and the forefinger between the ankles, and by a sudden traction effort the legs and thighs were brought down, the breech, now, plugging up the superior strait, leaving the funis above. By a rapid and forcible delivery, I was enabled, after a few moments, to present to a delighted mother a living child.—H.

camp, or Dudans, or what is still better, the *porte-cordon* in the shape of a fork, invented by M. Guillon. Rather than proceed to turning, recourse ought to be had even to the method recommended by Dr. Croft.

On this subject Madame Lachapelle, as well as many other moderns, says that the precept of the English surgeon ought not to be followed, inasmuch as, where the hand is introduced, it would be quite as speedy to draw down the feet. For my part, I am not of that way of thinking; the life of the child is too much endangered in forced delivery by the feet, for us not to prefer delivery by the head whenever it is possible.

When compelled to extract the fœtus by the hand or by the forceps, it is important to conform to the precept of Boer, which is, that previously to acting either upon the feet or the head, we ought not the less to endeavour to return the cord, which, without such precaution, could scarcely fail to be very much compressed, either by the hand of the accoucheur, or by the hips, the shoulders, or some other solid part of the child.

§ IV. DYSTOCIA FROM EXCESSIVE LENGTH OR SHORTNESS OF THE UMBILICAL CORD.

910. *Shortness.* Until the time of Baudelocque it was supposed that the delivery of the fœtus might be prevented, or at least considerably retarded by a very short cord. When the placenta is attached to the fundus of the womb, if the cord is less than six or eight inches in length, says De la Motte, the head, which is forced towards the inferior strait during the contractions, is found to rise upwards again during the intervals between the pains; the occiput is seen to engage in the vulva, to be on the point of clearing the strait at every effort made by the woman, and then, as soon as the pain is off, it re-enters the passage; and this continues for several hours.

The circumstance really takes place, but is altogether independent of the umbilical cord; it is chiefly to be met with in young women who are strong and robust, and at their first confinement. It depends upon the elasticity of the perineum: this flooring of the pelvis gives way while the womb, assisted by the abdominal muscles, urges the head onwards and makes it project from the parts; but as soon as the contraction ceases, its natural resistance returns the vertex into the interior of the pelvis.

However, it would be incorrect to assert, as Baudelocque does, that a cord's being too short cannot in any case interfere injuriously with delivery; in such a case the placenta is liable to be prematurely detached, which might facilitate the occurrence of inversion of the womb, give rise to hemorrhage, and bring the child's life into danger, should the labour be prolonged; the strain arising from it might weaken, or even arrest, or at least disturb

the contractions of the womb, and suspend the labour; but in no case can the mere shortness of the cord mechanically hinder the expulsion of the child.

911. *Excessive length.* When the cord is, on the contrary, too long, it generally has a strong tendency to procidence, and particularly to the formation of one or more loops around the limbs or body of the fœtus. These *turns* are frequently met with in practice, and oftener round the neck than anywhere else; where there are many of them, that portion of the cord that remains free may be really too short, whence the same accidents as under the former head might be feared. It has also been thought that they might obstruct the passage of the blood in the jugular veins, and act like ligatures, so as to produce a state of asphyxia. I have seen many children born with turns of the cord about the neck, and it has never seemed to me to be productive of danger in any case. Besides, in strangulation, death is produced by the stoppage of respiration, and death cannot take place in that way in the fœtus: again, I do not see how the cord can be drawn so tightly as to obliterate the internal jugulars or the carotids; therefore, at most, only the umbilical vessels are liable to be interrupted. It would appear, however, that these turns of the cord may exist for several months before the period of delivery, and thus give rise to some very curious anomalies. A fact lately observed by M. Monod, a resident pupil at the *Maternité*, proves that they may, like a branch of ivy round a tree, leave very deep grooves, and produce strangulations, &c., from which even the bones do not wholly escape. Moreover, it is fortunate that these causes of dystocia either do not exist at all, or but very rarely, for it is impossible to discover them until the head has passed the inferior strait; except in certain cases of breach presentation, in which the cord may be felt tightly stretched, either betwixt the thighs, around one of the limbs, or merely up along the abdomen, we can suspect the existence of these *turns* only upon conjectures that are too uncertain and vague to deserve the least confidence.

If, however, it should be ascertained that the cord is too short, it ought to be immediately cut, provided there should be any danger to the child, and the labour still far from its termination; care should be then taken to deliver the woman as early as possible, either by the hand or with the forceps. When it is not discovered until the escape of the head, it is in general easily to be remedied: if the *turn* be a very loose one, and the cord very long, the birth of the child is most generally not at all obstructed by it, and nothing need be done; in the contrary case, we must either disengage or cut the loop, so that the respiration may not be long in becoming established.*

* Dr. Smith, who relates a case of inversion of the womb, produced by the

§ V. ANEURISMAL DYSTOCIA.

912. An aneurism within the splanchnic cavities, or even in one of the great external arteries, is always a serious disease ; but it is yet rendered still more dangerous by the efforts of labour. The contractions of the muscles and the repulsion of the blood consequent thereto might readily occasion the rupture of a sanguine tumour, if haste were not made in emptying the womb. In such cases, therefore, the patient should be advised to assist her pains as little as possible, and as soon as the orifice is sufficiently dilated or dilatable, the child should be extracted either with the hand or the forceps.

§ VI. DYSTOCIA FROM ASTHMA, HYDROTHORAX, GIBBOSITY, DROPSY, &c.

913. All diseases that render the respiration difficult, may make it necessary for us not to trust the labour to the mere resources of the organism. It is well known that asthmatic persons are soon threatened with suffocation when under any state of violent exertion ; and that the same holds good of those who are labouring under some effusion in the chest, or in whom the free expansion of the chest is restrained by a deviation of the spine, &c. All wise practitioners, therefore, have recommended that in these circumstances the efforts of the woman should be controlled, and that she should be artificially delivered as soon as the state of the parts admits of the child's feet being brought down safely.

914. The same precept has been given where the labour is complicated by the presence of some large tumour in the abdomen, or with a dropsy in that cavity ; and that, because here, as in the preceding cases, the efforts of the womb might give rise to a fear of asphyxia, or at least might be followed by a dangerous collapse.

915. However, I ought to remark that many dropsical women go through their labours almost as easily as those who are in the enjoyment of perfect health. I saw at the *Hospital de Perfectionnement*, in 1824, a woman labouring under ascites who had been tapped thirty-six times, and who was, notwithstanding, delivered very naturally after a labour of a few hours' duration. Another who came to the same establishment in 1826, who had been dropsical for four years, and whose labour lasted only two hours, although her abdomen was enormously large, and although from ten to fifteen litres of fluid had been several times drawn off from the belly by tapping.

Nevertheless as the abdominal muscles are generally very much weakened, and separated, in ascites, by a thick stratum of shortness of the cord, recommends, with reason, that we should draw down a portion of that which is connected with the placenta, and then slip the noose over the shoulders, and not over the head of the child.

fluid, their mediate action can be possessed of but little energy in the expulsive part of labour.

§ VII. HERNIAL DYSTOCIA.

916. When the hernia, of whatever species it may be, is reducible, it should be returned to its proper situation before the pains become very strong, and then during each contraction its escape is to be prevented by holding the thumb, a compress, or the hand, upon the opening through which it passes outwards. This manœuvre is to be attended to by the accoucheur, or at least by an assistant fit to be trusted, and not by the woman herself. When it is an old and irreducible one, we must be content to support it exactly, so as to prevent it from becoming strangulated, or receiving an addition of new portions of viscera to those already contained within the tumour. Beyond this, the labour requires no particular assistance, and we should confine ourselves merely to moderate the disposition of the woman to improve her pains by bearing down; nevertheless, should the violence of the efforts be such that nothing could prevent the descent, or if there should be strangulation and the labour far advanced, the child should be extracted with all suitable precautions as soon as the dilatation of the os uteri admits of it.

§ VIII. DYSTOCIA FROM SYNCOPE.

917. Some women are so delicate, or so irritable and nervous, that they fall into syncope from the least pains; in other cases, the syncope and fainting are due to the extreme distension of the uterus, to the force of the contractions, to inanition, to an attack of hemorrhage, &c. In a lady who was pregnant with twins, M. Désormeaux found them to last throughout the whole interval of the contractions, and the woman only came out of them while the womb was reacting with violence upon its contents. Antispasmodics and opiates, either applied to the os uteri or taken internally by the mouth or anus, cordial tinctures and other such articles, a few spoonfuls of sound wine, or of broth, light food, &c., may be tried in succession or by turns; but, says M. Désormeaux, provided the life of the woman be threatened, we cannot wait for the effects of the remedies, no matter how well chosen they may be; under such circumstances, to temporize, would be a serious fault; we should terminate the labour as soon as possible, in order to prevent a fatal exhaustion.

918. It is uncommon for weakness, properly so called, to render a labour difficult; every day, valetudinary and phthisical women are met with who can scarcely stand, and yet bear their children without difficulty. Others are not prevented from being delivered naturally by a state of lethargy, of asphyxia, &c., and on more than on one occasion, the womb has been found to retain enough

contractility in dying women, or in those who had just expired, to effect the expulsion of the ovum. There are two principal reasons why our succours are most commonly unnecessary in these cases; 1. Although the muscles and the uterus have to a great degree lost their contractile faculty, the soft parts of the pelvis and the perineum also offer much less resistance; 2. The feeblest women, even those who seem to be upon the point of expiring, ordinarily recover an amount of courage and energy that forms a striking contrast to their extreme exhaustion.

919. Notwithstanding, it is not a rare thing to see these momentary efforts followed by an oppression and sinking, from which the women recover only after having run the greatest risks; many of them even are scarcely delivered till they fall into a morbid collapse, or sink gradually into death after a few hours, as if, in acting with some degree of violence nature's only object had been to terminate the great act of reproduction happily, at the risk of exhausting in an instant the small remaining strength still belonging to the organs? A young woman six months gone with child, who had been labouring for thirteen days with an attack of phlebitis, and who was in a decidedly adynamic state, was seized with the pains of abortion at four o'clock in the morning; at ten o'clock the os uteri was soft, and of the size of a three livres piece; at each contraction her cries, anguish, and agitation restored an appearance of strength, the existence of which was not suspected a few hours before; the poor woman was urged to redouble her courage, and make the utmost of her efforts; in fact the child was delivered at about eleven o'clock, but in an hour afterwards she was no more.

Consequently, as soon as the os uteri is sufficiently dilated wherever there is reason to fear too great a degree of exhaustion, prudence requires us to have recourse to a forced delivery. The forceps should be preferred in such cases, provided turning be not absolutely indicated, inasmuch as it is less fatiguing for the woman.

SECTION 2.

Essential Dystocia.

Labour is essentially difficult where the passage of the fœtus requires the interference of art, from its being rendered impossible, or greatly obstructed from some mechanical obstacle. Of these obstacles, some depend upon the women; others, on the contrary, depend upon the fœtus itself.

§ I. DYSTOCIA OCCASIONED BY THE STATE OF THE FEMALE ORGANS.

The difficulties that arise in the organs of the female are sometimes referred to the soft parts, and at others to the hard parts of her structure. The former alone will occupy our attention here, for as much as the latter were treated of in the section on *deformed pelvis*.

920. Various tumours have been observed in the pelvic excavation, and on more than one occasion, great difficulty has arisen from them in regard to the birth of the child.

They are pretty frequently found to occur in the perineum, or in the recto-vaginal septum; being variable as to size, consistence, nature, &c.; they are far from always requiring the same kind of treatment; when not very large or capable of being flattened by pressure, if other circumstances are favourable, they do not always prevent the spontaneous delivery of the child; scirrhus or fibrous masses connected with the ovary, the intestines or epiploon, when sufficiently movable to sink down and lodge betwixt the uterus and sides of the pelvis, present a peculiar indication; they require to be displaced and carried above the superior strait; for this purpose, the woman must be placed upon her back or side, in such a way that the pelvis may be higher than the breast, and all the muscles in a state of relaxation; then by means of the hand or fingers, we attempt to push the tumour out of the passage; finally, when all attempts at reduction have proved to be fruitless, it may become indispensably necessary to extract the tumour by making incisions through the vagina or rectum, or even to have recourse to the Cæsarian operation.

921. *Sarcomatous*, scrofulous, fibrous or other tumours that are situated in the cellular tissue of the pelvis, and that cannot be displaced, are much more dangerous than the foregoing ones; by resisting the head of the child, they expose the womb and other organs contained within the excavation to contusions, perforations and lacerations that it is not always an easy matter to prevent; they also induce inertia and exhaustion, and pretty frequently excite hemorrhages, convulsions, or various kinds of inflammations.

922. Those of the recto-vaginal septum are, most generally, simple encysted tumours; this at least seems to result from the observations of Plenck, of M. Pelletan, and a case recently noticed by M. Roux at *La Charité* at Paris. The woman has sometimes succeeded in expelling them, either through the anus or through a laceration in the perineum. In some cases they have been ruptured by the muscular efforts, and that without any ill consequences, when the fluid they contained was permitted to escape into the rectum, the vagina, or even to be effused in the surrounding cellular tissue. But they may also end in abscess,

gangrene, or a mortal peritonitis, if the laceration extends into the peritoneum. It is, therefore, most prudent to empty them or extract them as soon as they are ascertained to be capable of hindering the escape of the fœtus, or rendering it dangerous. In such cases, it is not always an easy matter to distinguish an hydatid or encysted tumour from such as are solid; but, as has been pointed out by M. Désormeaux, a puncture with a small trocar will suffice to remove all doubts upon the subject.

923. *Calculi in the bladder.* It is evident that a large stone might, during labour, become situated directly behind the pubis, so as to shorten the antero-posterior diameter of the pelvis. But a stone being violently pressed from above downwards, by the child's head, would almost necessarily give rise to contusion or laceration of the bladder or of the recto-vaginal septum, as well as the pain that would ensue thereupon. It would be easy, at the commencement of labour, to push the stone upwards, and retain it above the symphysis pubis, until the head could get below it. Should the practitioner arrive late, and find the stone coming down before the head, he should, notwithstanding, endeavour to raise it above the strait. Where it is impossible to get it up, there is one resource left, which is to cut down on the stone through the anterior side of the vagina, or to perform vaginal lithotomy.

924. The labia or nymphæ may have become agglutinated posteriorly to the fecundation, and either wholly or partially close up the vagina. The hymen may be hard, fibrous or cartilaginous, so as to leave but a small orifice, and thus interfere with the escape of the child (143). Delivery is not in such cases impossible: such feeble barriers are incapable of counterbalancing the energetic contractions of the uterus; but it is better to divide with an instrument those parts that have to be separated than to expose the woman to the risk of ruptures and irregular lacerations whose limits cannot be prescribed, and which might go to a dangerous extent.

925. Where the vulvar extremity of the vagina is completely *obliterated*, no conception could possibly have taken place by the natural passages; but it is not uncommon to meet with *bridles* or partial contractions in some part of the canal. Where these frena are not very old, or very hard, they ordinarily become softened and yield to the mere progress of the labour; where they resist, so far as to awaken a fear of laceration of the womb, inertia, convulsions, exhaustion, or their own rupture, they should be divided by making a few small incisions on their anterior edges. A woman who was in labour of her third child, and who two years previously was delivered by means of instruments, was brought to the *Hospital de Perfectionnement*, by M. Dubourget, after having been three days in travail: I was about to apply the forceps, but was soon arrested by a large crescent-shaped bridle, which was hard, and as it were, fibro-cartilaginous, which was two inches above the

vulva, and on the free edge of which I found it necessary to make three incisions.

926. When the vagina opens into the *bladder*, fecundation being on that account evidently impossible, it is therefore useless to class this deviation among the causes of dystocia.

Several authors, and among others Barbaut, and still more recently M. Marc, have made mention of women in whom the vagina opened into the *rectum*, who notwithstanding became pregnant, and yet were delivered without any artificial aid.

Stegmann relates the case of a girl whose vagina opened *above the pubis*, and Morgagni speaks after Gianella, of a case in which fecundation nevertheless took place: in such a case it would be necessary first to try, like the Italian accoucheur, to dilate the preternatural opening, and should that prove insufficient, to make several eccentric incisions upon the orifice, not losing sight of the proximity of the peritoneum and bladder.

Scirrhus or fibrous tumours capable of affording an obstacle to delivery, and requiring serious operations, rarely occur in the vulva; but chronic or acute phlegmons are met with that might be singularly aggravated by the passage of the *fœtus*, and it is important, therefore, that they should be very energetically treated in women who are approaching their term.

The labia are, at times, the seat of *bloody tumours*, of a particular kind, that I have long mentioned in my lectures, which Dr. Dewees also has described in the American journals, and to the consideration of which I shall return when I come to treat of the accidents of parturition; for the present I shall content myself with stating, that where they are sufficiently large to interfere manifestly with the birth of the child, or expose the mother to very acute suffering, I should not hesitate about plunging a bistoury into them, so as to empty them completely.

927. Some women, though in other respects robust, are affected, towards the close of pregnancy, with a considerable *infiltration* in the lower limbs, and even in the whole body. The cutaneous and mucous folds of the vulva may in such cases attain to an enormous size, and completely close the vagina; the termination of a labour is thus rendered, of necessity, much more difficult, and above all much more painful; it cannot be dissembled, that by leaving nature to herself here, there will be reason to fear the occurrence of gangrene, or of more or less extensive lacerations; unhappily, although threatened with such dangers, there is little that the accoucheur can do; some punctures, the application of emollient and sedative lotions, and care in relation to the disposition of the parts and to the muscular efforts of the woman, afford all the materials for his counsel.

928. *Inversion of the vagina* may take place during pregnancy and even during labour. I was called last spring, by Madame

Bevalet, to see a woman who had been suffering for thirty hours without being delivered. The head of the fœtus was quite down in the excavation; but the vagina, which was entirely inverted, exhibited outside of the vulva, the appearance of a fungous and livid cushion larger than two fists. It was necessary to apply the forceps for the delivery of the patient.

929. Much has been said about the obliteration of the os uteri of women in labour; but if it is not wholly certain, it is at least highly probable that the authors who have mentioned it were misled by some deviation affecting the os tincae. I have already seen so many practitioners, even experienced ones, affirm that there was no os uteri at all, in cases where it was merely raised up towards the sacro-vertebral angle, that it seems to me very easy to refer a great majority of the cases of supposed obliteration of the os uteri to this mistake alone. It is evident that nothing less than some severe disease, some acute inflammation, could thus close up the mouth of the womb, betwixt the fecundation and the term of gestation; but in that case the parts would necessarily be affected with concomitant alterations of structure, sufficient to remove all doubts; the anamnestic signs would have attracted attention precedently, and abortion could rarely fail to take place.

However, if authentic examples be wanting of complete obliteration at the period of labour, we at least possess several instances of coarctation, partial or total induration, and still more numerous ones of stricture in some other portion of the os uteri.

Were the canal closed by a spongy or polypous mass, like those met with by Denman and M. Evrat, we should wait for its decent into the vagina, to attempt its extraction, after which we should proceed as in any other case of parturition.

930. A scirrhus *induration*, of partial extent, might require no particular assistance. In a case mentioned by M. Désormeaux, the whole dilatation took place at the expense of only two-thirds of the circumference of the orifice, and the escape of the ovum was scarcely retarded; but if the whole of the cervix uteri were involved, either at its vaginal extremity, or at a point near the cavity of the uterus, the vaginal-Cæsarian operation would be indicated, it being well understood that a forced dilatation with the fingers or the *speculum*, either could not be attempted, or had been vainly tried.

931. A fibrous tumour, a scirrhus, a polypus, cicatrices, an ulcer, an abscess in the substance of the womb, or even upon its internal substance, would also require particular precautions, provided it were possible to ascertain their existence. In the first place, the diseased point does not in general partake in the extension of the organ during pregnancy, or does not contract again after delivery; in the next place, it deranges or interrupts the contractions during labour, and in that way favours the occurrence of

convulsions, laceration of the womb, hemorrhage, inertia, and general exhaustion. In order, therefore, to protect the woman as far as possible from such dangers, it would be necessary to extract the child, without waiting too long, either by the hand or with instruments.

932. Labour is also sometimes rendered very difficult, and even wholly impossible, by means of *displacements* and *deviations* of the womb.

There are instances of complete prolapsus which did not prevent the woman from being fecundated; witness the peasant woman mentioned by Morgagni. In other cases, the falling of the womb occurs during pregnancy. In both cases, provided the gestation goes to its full term, it is possible for the womb, which here cannot be seconded by the abdominal muscles, to deliver itself alone; but it is also possible that the pains should prove to be insufficient, and thenceforth prudence requires us to make use in succession of decoctions, mucilages and ointments of an emollient nature, and resort to the dilatation or incision of the edges of the orifice, and afterwards bring down the child's feet.

Sennertus and Ruysch have related cases of hernia of the womb, where the women have, notwithstanding, become pregnant; but every consideration leads to the belief that mistake here has more than on one occasion arisen from a very decided anterior obliquity of the womb.

This kind of displacement forms, in the opinion of several authors, an insurmountable obstacle to the spontaneous termination of labour; so that, under such circumstances, they have thought of no better counsel than that of resorting to the Cæsarian operation: however, this last recourse will hardly be taken by a man who is fully acquainted with the resources of the animal economy. Provided the reduction be possible, the accoucheur will attempt it: in the contrary case, he should be content with recommending the horizontal posture, and advising the woman not to bear down. During the contractions, and even during the intervals between them, it is proper to press the uterus backwards, with the two hands applied to the epigastrium, as if to make it re-enter the abdomen; by means of these precautions, which are not even always indispensable, the os uteri dilates, opens, and the labour most frequently terminates without further assistance, and without danger, even in cases apparently the most difficult. An accoucheur at Copenhagen was called to a woman who had for a long time had a crural hysterocele, and who exhibited some symptoms of pregnancy; the period of delivery arrived, the surgeon had given the most unfavourable prognosis, and thought he should be under the necessity of performing the operation of hysterotomy. But nothing of the kind happened, and the labour terminated spontaneously. Ruysch and Simon relate two cases of uterine hernia

equally remarkable; in one of them the Cæsarian operation was performed and the woman died; in the other, nothing was done, and both the mother and child were saved!

Simple deviations of the womb may also interfere with the progress of parturition and require some particular care. Upon this subject I ought to remark, that it is far more important than writers seem to suppose, not to confuse deviations of the cervix with those of the womb strictly so called. In fact, although the deviation of the orifice pretty frequently coincides with that of the fundus of the organ, it is nevertheless undeniable, that one is often met with, without the other.

933. When the womb is inclined laterally or backwards, no great difficulty can arise as to the delivery of the child, provided there should be no other cause of dystocia. In the anterior obliquity, on the contrary, especially when it is to a great extent, the assistance of art may become indispensably necessary. The woman should be directed to lie down at the very beginning of the labour, and told to remain in a horizontal posture, taking care to keep the hips considerably elevated; the hypogastrium is to be pressed backwards, while by means of one or two fingers introduced into the vagina we attempt to draw the os uteri to the centre of the pelvis. These last-mentioned tractions, which are useful where the orifice is found raised upwards towards the sacro-vertebral angle, need not be tried in cases where the womb, instead of being inclined by a see-saw motion, is bent forwards on its anterior surface like a chemist's retort? But in that case we should direct the woman to moderate, or ever to suspend, her efforts; for, during the pains, the action of the diaphragm and abdominal muscles tends constantly to augment the obliquity, and thus to annul the efforts of the practitioner in a contrary direction. In the spring of 1825, I was called by M. Majesté to a woman whose labour had been at a stand for several hours, notwithstanding the pains were very severe. The womb, bent into the form of a retort, was so disposed that at each contraction its posterior surface became quite horizontal. I showed the patient that her efforts were not only of no use, but also that they were sufficient to prevent her labour from coming to a conclusion. She was obedient to the counsel I gave her, and resisted, as far as she possibly could, the sensations that excited her to bear down. It was not long before the womb rose up of its own accord during the contraction, the head soon engaged, and in two hours afterwards the child was born. There are, therefore, certain cases of inclination where the labour ought to be abandoned almost entirely to the mere contractions of the womb.

934. Doubtless, Moschion and Deventer were wrong in maintaining that obliquity of the womb most frequently produces a transverse position of the fœtus; but it would be quite as unrea-

sonable to maintain that this effect never does take place. If the inclinations of the womb do rarely suffice to produce real transverse or shoulder presentations of the fœtus, they, at least, seem to me to be very frequently the causes of presentations of the face, the forehead, the nucha, the parietal protuberances, the hips, &c., and in this respect to deserve the attention of the accoucheur.

935. I ought in this place to mention a kind of deviation that I have never met with but once, of which I have been unable to find any cases described by the various authors, and which ought not to be confounded with anterior obliquity. In a woman who came to be confined at my amphitheatre in the month of May, 1828, the fundus of the uterus was rather inclined backwards than forwards; the head of the fœtus formed above the strait a considerable projection, which descended nearly to the vulva, and was at last situated in front of the symphysis pubis; the os uteri, which was on a level with the superior strait, seemed to be scooped out of the substance of the posterior wall of the womb, which made it much longer behind than before; in order to reach the orifice and penetrate towards the head of the child, I was obliged to bend my finger so as to make it pass almost horizontally above the pubis. Such a state of things surprised me, and I mentioned it to the students, who easily satisfied themselves as to its existence. The progress of the labour was so much retarded by it, that after seven hours of pain and pretty strong contractions, the os uteri, although very soft and very dilatable, was scarcely open at all. M. Désormeaux, whom I invited to see this remarkable case, said that he had never noticed one like it, and agreed with me that by means of position and the assistance of the hand properly combined, I ought to try to carry the head to the centre of the superior strait, by making it slide from below upwards and from before backwards over the pubis. I began to execute this manœuvre at half past eight o'clock, and continued it alternating with several of the students until nine o'clock. From this time there was no longer a tumour in front of the symphysis, and the labour progressed so rapidly that in less than an hour the child was born and the placenta itself expelled.

Such a state of things seems to depend: 1st, on a posterior inclination of the womb; 2d, on the excessive inclination of the superior strait; 3d, on some deviated position of the fœtal head, and, perhaps, upon the thickness, or the unequal density of the walls of the womb; to this displacement should be referred the positions described under the name of *sur-pubal* by Madame Lachapelle and M. Dugès.

936. I have many times found the orifice turned so much backwards or to the outside, that its plane was almost parallel to the axis of the woman's body, although the rest of the womb was scarcely deviated at all. Excessive amplitude of the pelvis, great

inclination of its superior strait, and presentations of the vertex, are probably the causes that most favour its obliquity. In touching, we feel, sometimes almost at the bottom of the excavation, and at others rather higher up, a tumour, generally very even, and which consists of the child's head covered with the anterior wall of the distended cervix of the uterus. This state of things has to me seemed to impress upon labour a peculiar character of tediousness, and often coincides with what is called *pains in the reins*. The ablest writers and Baudelocque himself, recommend, as a remedy, that we should hook the os uteri with one or two fingers, draw it towards the centre of the pelvis during the intervals between the pains, and keep it there during the contractions; or also, have recourse to vaginal hysterotomy, the only means of avoiding gangrene or rupture of the womb, &c. Were I to depend upon my own experience in this matter, I should be led to think that the interference of art, in this state of things, is rarely necessary, and that in more than one case there has been too great haste in acting, to the great detriment both of the mother and child. I for a long time conformed to the precepts laid down in the books; I pulled at the os uteri, and did all I could to bring it back to the centre of the excavation; it is true I succeeded, but pretty often not until I had remained several hours with the woman. I was one day obliged to leave a student as my substitute, who neglected the directions I gave him; after an absence of three hours I returned, found the os uteri completely dilated, the membranes ruptured, and the head strongly engaged. From that time I have never interfered in such cases, and the organism has always succeeded in restoring things to their natural state. My design is not to conclude from this that we must never do any thing but wait, but merely to observe, that excepting in a small number of cases, nature herself may suffice, and that a resort to bloody operations ought not to be lightly resolved on.

937. Gibbosities and acute diseases do not become a cause of dystocia, excepting as they often do not allow the woman, without danger, to give herself up to the efforts needed for the delivery of a child; but there is another very remarkable cause of difficult labour which no author has mentioned. A strong, robust woman, pregnant with her first child, in the forty-fifth year of her age, had been in labour for forty hours, when M. Morisse sent for me to see her. The presentation was good, the head had been in the excavation for twelve hours without advancing, in spite of the energy of the uterine contractions. The skin on the fore part of the thighs and abdomen was all covered with old cicatrices, which were hard and fibrous, and confined the lower part of the hypogastrium, so that the womb was as if strangulated immediately above the pubis, and the child could not descend. I applied the forceps, and the child was brought away living.

§ II. DYSTOCIA DEPENDING ON THE FŒTUS. MONSTROSITY.

938. *Excessive volume.* There is no doubt, says M Dugès, that where the child is very *tall*, it may render a labour more tedious, painful and distressing, especially if the passages are not soft and small, as in a first labour; but it is not yet proved that great size in a well-formed child at full term has ever alone constituted an insurmountable obstacle to spontaneous parturition.

If it be true that Baudelocque, Chaussier, M. Capuron, &c., have seen children born, weighing near thirteen, twelve, or even ten pounds, it is, nevertheless, certain that we no longer see them reaching to the weight of fifteen, twenty, and twenty-five pounds, nor any whose length exceeds from twenty-two to twenty-three inches. But as it is an easy matter to ascertain that the head of a fœtus of twenty-two inches will not be quite four inches in its occipito-bregmatic and bi-parietal diameters, it is at once evident that, even in case of extreme size, spontaneous delivery is not impossible. It should be remarked, however, that in that case the least narrowness of the pelvic cavity, especially in the perineal strait, must promptly become the cause of dystocia.

On the other hand, the practitioner ought to know that under such circumstances, version by the feet is never proper. Indeed, where the head presents, although its shortest diameter and smallest circumference are almost always in relation with the largest diameters of the pelvis, it is rarely that in extracting the child by the feet the occiput is not forced to turn over more or less upon the back, while the occipito-frontal, which would be nearly five inches long, would take place of the occipito-bregmatic diameter, perhaps it might even be the occipito-mental that would be thus situated, and that would be at least five and a half inches in length.

The best course is to confide in the resources of the organism, and where it is indispensably necessary to act, to attempt the application of the forceps rather than venture upon turning; and should it be a presentation of the pelvic extremity of the fœtus, either originally or by turning, every precaution should be employed to prevent an arm from becoming locked behind the neck.

939. *Infiltration* of the integuments of the head, and sanguine tumours, sometimes evidently increase the size of the head, but rarely to such an extent as to furnish any real obstacle to delivery. Harnier, to be sure, has remarked that where thrombuses and infiltrations are of such magnitude as to deserve any particular attention, by engaging in the space under the arch of the pubis, such tumours prevent the rotation movement which the head ought to execute in order to clear the inferior strait.

940. *Hydrocephalus* constitutes a much more real, and particularly much more serious cause of dystocia; it is recognized by various signs: the finger feels a broad and tense tumour; the bones

of the head are evidently separated and very movable; the dimensions of the fontanels are very considerable; sometimes we meet with Wormian bones of various sizes in the midst of spaces that are completely membranous; as to the infiltration of the limbs and hypogastrium of the mother during gestation, ascites, hydramnios, anasarca, the lymphatic constitution and the rational signs that have been supposed derivable from the size of the head, tongue, and forehead of the woman, they can give rise only to conjectures that are wholly useless in the establishment of a positive diagnosis. Moreover, it is necessary to take care not to be imposed upon by an accidental deficiency of ossification, by a fontanel, by abnormal sutures, or a great degree of flexibility of the bones, and to recollect that hydrocephalus, during intra-uterine life, is so rare, that according to Madame Lachapelle and M. Dugès it was only met with fifteen times in 43,555 labours.

941. In order to comprehend the dangers of this species of dystocia, it should be well understood that serous fluids may accumulate in various quantity in the cranium, and that if the head is soft and its size not very greatly augmented, the mere energies of the woman in general suffice for its expulsion. When its size is not excessive, and the womb threatens to fall into inertia, recourse is had to the forceps, taking care to make use of a moderate degree of pressure, so as not to burst the head, nor allow of the instrument's slipping. Where the child is dead and the head is too large to get through the straits, cephalotomy becomes a last resource, which we are obliged to employ.

Notwithstanding, I ought not to conceal that this subject has been and still is the subject of a very important question among practitioners. Where we have a certainty that the child is dead every body is agreed; but in the contrary case, it has been asserted that we have no right to kill it, and that it would be better to perform the Cæsarian operation or symphyseotomy. Others have objected that a child ought not to be the assassin of its mother; that as hydrocephalous children die very soon after their birth, it would be contrary to humanity as well as to morality to sacrifice a sound and healthy woman for a being whose existence is so precarious. These reasons are, in my opinion, of the highest authority; for, although, as M. Dugès asserts, it be true that a slight degree of hydrocephalus ought not necessarily to occasion the death of the child, does not always prevent its viability, and may sometimes be cured, it is equally certain, that in case the head is not so large as absolutely to require the operation, and that where even the disease is so advanced as to render the delivery impossible, we have no ground to rely upon the viability of the child. But how is the liquor amnii to be evacuated? Should it be done with Smellie's scissors, Stein's *perce-crâne*, a common bistoury, or is it better, like MM. Maygrier and Dugès, to be content with a

simple trocar? Since, according to Holbrock, Vose, &c., the puncture has been successfully performed after birth, and as large lacerations are not required to give issue to the serum of hydrocephalus, I perceive no inconvenience likely to arise in pursuing this last-named course, inasmuch as it at once satisfies the indications of prudence and the wants of practice. But if the head should not be thereby emptied sufficiently to render its escape easy, I should not hesitate about plunging one of the other instruments into the head.

After the operation of cephalotomy has been performed, the contractions of the womb generally suffice for the expulsion of the head; but if this should not be the case, recourse is had to the forceps, to turning, or to the crotchet.

942. I do not know that *hydro-rachis* has ever proved to be a real obstacle to the termination of a labour. It is a dangerous disease to the fœtus, and that is all; besides, nothing could be easier than to empty the tumour by pushing a trocar into it, should it appear to interrupt the progress of the labour.

943. It is rare also for *ascites*, and particularly for *hydrothorax*, to be of such extent as to furnish considerable obstacles to the delivery of the child, as appears from the remarks of Baudelocque, M. Lamoureux, and M. Dugès. In all cases those lacerations and eviscerations that were practised by Deventer should be avoided, as well as the mode recommended by Mauriceau, of perforating the navel or the neighbouring parts with the finger; simple punctures, made with a trocar or a bistoury, always suffice to produce the effect which it is desirable to obtain.

944. Solid tumours developed upon certain parts of the trunk, or any decided deformity, like the case related by Baudelocque, and another one published by M. Nivert, might require some peculiar attention; or even render delivery wholly impossible. Cases of this sort are particularly untoward, inasmuch as it is, generally, quite impossible to ascertain the circumstances until after delivery. Thus, in the case that fell under M. Nivert's notice, the fœtus had a very solid and projecting gibbosity which lodged above the pubis; the forceps was applied, but without effect, for it became necessary to empty the head; still, it was only by means of the crotchet and by employing the utmost strength, that he succeeded in extracting the trunk of the fœtus. Who could have suspected the existence of such an obstacle? and even had it been understood, what could have been done? Ought turning to have been attempted? Would any advantage have been derived from pressure suitably applied to the lower part of the hypogastrium? It belongs to future experience to solve these questions.

945. The simultaneous presence of *several fœtuses* in the womb is far from always being a cause of dystocia, especially when they are independent of each other, and are each enclosed within a

separate amnios. But this is not the case where they are contained within the same set of membranes, or have contracted any adhesions that compel them to present simultaneously at the straits of the pelvis.

In the latter case, the union of the children may be in very various degrees. Sometimes they are connected together by a very circumscribed point upon the inferior, middle, or superior part of the back, sometimes by almost the whole back, side, or front; at others they are conjoined at the head, or placed end to end at the breech. The fusion is in some cases much more complete: or, there may be only one single trunk to two heads and two or four arms; or, on the contrary, there may be only one head to two trunks, with limbs more or less completely isolated.

946. The signs of these monstrosities are so vague, that they really do not deserve to be repeated in this place; there can be no certainty, nor even probability, of their existence, except in so far as certain portions of the fœtus are already emerged; and even then it is for the most part very difficult to characterize the nature of the monster we are about to receive.

We have enough of cases of monsters from excess of parts, born living and under the mere resources of nature, to warrant us in not acting too hastily in such circumstances. If a double fœtus with a single head presents by the vertex, or even by the feet, provided the conformation of the pelvis be good, the delivery will not require any particular interference; the same would be the case with two fœtuses attached to each other by their extremities, either the head or breech, as is proved by the cases mentioned by Meckel, Palfyn, Duverney, Home, &c. Further, M. Dugès saw one born without assistance, though it was completely double, at full term, and of large size. But again, the observations of Plenck, Smellie, &c., demonstrate that monsters of a much smaller size have, on more than one occasion, rendered delivery very distressing, both to the mother and the accoucheur, particularly where there was a great desire to have them born alive.

947. When there are two heads to a single trunk, provided the one that is in front succeeds in engaging first, the second may follow without any extreme difficulty, and being forced downwards, they will clear the vulva, almost as easily as if there had been but one. When such a monster presents by the feet, the posterior head ought to descend first into the excavation, whilst the other remains above the pubis; the woman may exhaust herself in vain efforts, and the intervention of the accoucheur may become indispensable. But previously to operating, several questions present themselves to the practitioner; is the monster dead, or is it living? In the latter case, are we to act upon the woman, or upon the fœtus! I know that a double child, or one that is simply bi-cephalous, may live and grow after birth; that several

have lived for seventeen, or twenty years, and even to a very advanced age ; that a fœtus seen by Everard Home that was born in the East Indies, and which died at three years of age of the bite of a serpent, grew as regularly as the best formed child, though it had two heads united together at the vertex. Who is unacquainted with the history of the monster noticed in China, and of which an account was laid before the *Academie des Sciences* last year? I do not wish therefore to maintain that such beings are of necessity unlikely to live; but is it true that they have the same rights as any other fœtuses to our care and solicitude? Is their life so valuable, that with the view, and under the few chances of preserving and raising them, we are bound to perform on the mother a most dangerous and too commonly fatal operation? I am aware that by the Cæsarian operation we may save the child, and not cause the mother to perish; but is it not well known that one half of the women who submit to it lose their lives, and that almost all the fœtuses soon undergo the same fate? I do not hesitate to say, and I believe in conformity to the sacred laws of humanity, that if I were obliged to choose between hysterotomy and the murder (*meurtre*) of a monster, I should not vacillate a moment; I would sacrifice the fœtus. Happily, the skilful accoucheur can scarcely ever be subjected to this distressing alternative; manœuvres well arranged, and performed either with the hand, the forceps, or the lever, almost always succeed in disembarassing the woman through the natural passages, without injuring the child.

948. The turning and delivery by the feet resorted to by Pen, Walter, Walgen, M. Evrat, M. Brez, Regnoli, &c., and recommended by Asdrubali, MM. Désormeaux, Dugès and others, whether the child be exactly double or merely bi-cephalous, living or dead, and at any stage of gestation, will suffice in nine cases out of ten, at least, where there are no other causes of dystocia present. It ought therefore to be tried in all cases. However, if one of the heads should be already so far engaged, that it could not possibly be returned, we might, after the manner of Plenck, try the application of the forceps. Should the forceps prove insufficient, there would be a last recourse, the removal of the parts that had descended into the excavation, that is to say, of the head alone, or the head and arms; after which the feet could be brought down so as to deliver by turning, as was done by M. Retel, in 1818, in such a case. There would be less to fear in such a case, as the fœtus generally dies long before we are reduced to this extremity. The difficulty of separating two children, united to a certain extent, outside of the womb, and the danger to which by such operations they are exposed, clearly show how imprudent it would be to follow the advice of Smellie, and attempt to do so, in the interior even of the uterus.

949. When, in twin pregnancy, two fœtuses present simultaneously at the straits, the intervention of art almost always becomes necessary, and sometimes indispensable. If it be found that both the heads tend to engage at the same time, which is excessively rare, it is proper to push up the most movable one with the fingers, so as to let the other advance first; the same procedure may be adopted for the feet, the knees or breech; if the children present across, or in any other way except by the head or the pelvis, recourse must be had to turning; but it may happen that one of them comes by the head, whilst the other descends by the feet, and that upon reaching the superior strait the chin of the latter hooks in with the chin of the former, so that the two heads at length become immovably fixed, each opposing an insurmountable resistance to the other, and constituting one of the most embarrassing cases in the practice of midwifery; neither turning nor the application of forceps can be thought of; even the Cæsarian operation itself, which has been recommended by some authors, would not always enable us to disengage the fœtus; so that the detruncation of the one that is without, constitutes almost the only resource left to us for the safety of the mother and one of the children.

SECTION 3.

Dystocia from Wrong Presentation of the Fœtus.

It has been seen in another article that the presence of one of the extremities of the occipito-coccygeal diameter of the fœtus at the superior strait is one of the first conditions of eutocia. All the cases in which any other point than the head or pelvis presents ought therefore to be classed among the cases of dystocia. I will add that to them should be conjoined all the deviated positions of the head or breech.

§ I. DEVIATED POSITIONS OF THE HEAD.

Under this title I comprise the positions of the sides of the head, of the ears or of the temples, admitted by Mauriceau, Deventer, De la Motte, and Baudelocque; and those of the occiput, in so far as they really exist, as was understood by the last-named author: as to the forehead and face positions, since they do not, in general, prevent a labour from terminating without assistance, I shall say nothing about them in this place.

950. Positions of the *occiput* or upper part of the nucha are rare, and scarcely occur except in very decided anterior inclination of the womb. Then the vertex may be turned towards some point on the circumference of the pelvis instead of corresponding

to the centre of the strait; should pushing the womb backwards, keeping the woman on her back, or the mere efforts of the organism prove to be insufficient to re-establish the natural position, it would be necessary, with the fingers, the lever, or one of the blades of the forceps, to hook the upper part of the cranium, and draw it down towards the centre of the excavation, upon which the labour would return to the natural order.

951. The *lateral* positions of the head, being nothing more than slightly modified positions of the vertex, are the same in point of number with them; they are marked by the presence of the ear, of the angle of the jaw, or the parietal protuberance: they are distinguished from each other by considering to which point of the strait the posterior edge and lobule of the ear are turned; they are, moreover, rare, and generally end in conforming themselves, spontaneously, to the corresponding positions of the vertex or shoulder.

We ought, consequently, to trust to the efforts of the womb, as long as the os uteri continues to be sufficiently dilated; if they then persist, we must, as in positions of the occiput, endeavour to bring back the vertex to the centre, by means of the fingers, the lever, or one branch of the forceps; or, where it is a shoulder that is too far advanced, the child should be turned and delivered.

§ II. DEVIATED BREECH POSITIONS.

952. The pelvis may, like the vertex, incline in any direction, and give rise to what have, by the authors, been denominated positions of the hips, sacrum, front of the thighs, and genital organs. Produced sometimes by the inclination of the child no longer agreeing with the vertical axis of the womb, and sometimes, which is more common, by obliquities of the uterus, the deviated positions of the breech do not always prove insurmountable obstacles to spontaneous delivery. Nature often succeeds, alone, in transforming them into direct positions, so that if the labour progresses in other respects regularly, the assistance of art rarely becomes necessary.

However, we must not, for fear of acting unnecessarily, remain inactive under accidents or sufferings which it would be easy to prevent or alleviate by a skilful manœuvre. Whilst the membranes continue unruptured, all we ought to do is to restore the womb as far as possible to its natural attitude, either by pushing it with the hand into the axis of the strait, or by causing the woman to assume such or such an attitude, according to circumstances. But if, the membranes being ruptured, the os uteri, although soft, should dilate with exceeding slowness; if the pains should be directed with great force towards the *reins*, or the strength appear likely to be exhausted; or lastly, should any accident supervene, the accoucheur ought to wait no longer: he

should try to reach the deviated part with his fingers, or even with the lever, if it be the hip or sacrum, and restore it to the centre of the pelvis; or he may proceed at once to seek for the feet or the knees.

§ III. POSITIONS OF THE TRUNK OF THE BODY.

It is incontestable that the trunk sometimes presents at the superior strait otherwise than by the head or pelvis; this has been admitted by practitioners in all ages, and has been a thousand times proved by observation. But is it true that these presentations exhibit shades so various and multiplied as has been asserted by the authors? In the first place, is it possible for positions that are frankly transverse, to take place either before or after the discharge of the liquor amnii, when the fœtus is at full term and well grown? For that end it would be required that the transverse diameters of the womb should exceed the perpendicular; but even should such a disposition exist before the commencement of labour, can we conceive that it could maintain itself under the contractions of the gestative organ? Would not those contractions necessarily compel the head or the breech to descend towards the os uteri? Mauriceau, Deventer, Smellie, Rœderer, &c., have given drawings representing such positions, it is true; but none of them is said to have been taken from nature, and a mere glance suffices to satisfy us that they are all fancy-pieces. If the ideas of these authors have in our own day been reproduced, with additions, is it not rather in order to be conformable to the notions of the ancients than from direct observation? Could Solayres and Baudelocque be fit judges of a question never precedently agitated, particularly as they had such motives to retain it as it had been laid down, in order to magnify the importance of a classification which in a great measure constituted their reputation and their glory?

I desire that, here, as well as in the succeeding articles, no one will misconceive of my intentions, and that I may not be charged with want of reverence for so many celebrated names; I merely express my doubts, and do not pronounce judgment; but, were it necessary to combat the opinion and the arguments of those accoucheurs, whether ancient or modern, who have admitted the existence of transverse positions, by means of authorities not less respectable than they are, I would suggest, without any allusion to my own experience, that out of more than forty thousand cases noticed by Madame Lachapelle, and twenty thousand mentioned by Merriman, not one of these presentations was observed; finally, that M. Dubois and M. Dugès reject them as chimerical or superfluous.

953. Is it, then, demonstrated that the child may present either of its three principal surfaces at the entrance of the pelvis, and

that inclined positions of the side have not been mistaken for positions of the dorsal or abdominal surface? A multitude of cases are found in books, which, if taken according to the letter, would lead to an affirmative answer to these questions; but, upon analyzing them with some degree of care, they are soon found to be accompanied with details not sufficiently circumstantial to serve as incontrovertible proof of what their authors have averred to be the facts. According to Madame Lachapelle, positions of the anterior and posterior regions never do take place, and those of the side are the only ones that we can conceive of, except it be in some abortions; she maintains that positions of the dorsal surface would not fail, under the influence of the uterine contractions, to be soon transformed into positions of the shoulder, should they not result in being reduced to some positions of the head or pelvis; that those of the abdominal surface would require a reversement of the occiput, of the lower extremities and spine, incompatible with the life of the fœtus. For my own part, I think that the *back* and the *anterior* surface of the fœtus may present at the superior strait; that these positions have been observed; that proofs of them are contained in the works of Deventer, De la Motte, &c., but that they are rare, and differ so little from the positions of the side, as to require only very slight modifications in the manœuvres appropriate to these latter.

954. Baudelocque admits, further, that in the posterior surface we should distinguish the occiput, the nucha, the back, the loins, and the posterior surface of the pelvis; and that the anterior and lateral surfaces require the same subdivisions. But while we admit that the fœtus may indeed present by these different points, it would be, nevertheless, useless to adopt such numerous positions, for they are of no practical application, overload the memory without any object, and only serve to discourage the student.

955. The simple good sense and observations of Denman and Madame Lachapelle, prove that the nucha cannot maintain itself at the superior strait, that it would soon give place to the head or shoulder, and that positions of the hips or loins could not fail to be soon transformed into a direct or inclined position of the breech.

It is then evident that a position of the abdomen has often been supposed present, when, in reality, it was only an inclined position of the breech, feet, or knees, complicated with one of the arm, or with a premature escape of the umbilical cord. Madame Lachapelle thinks that the throat would not, under the contractions of the womb, be long permitted to remain at the orifice, for the pains would bring the face there far more easily. I am in possession of no facts to militate against the opinion of this author, and know that on this point many practitioners might have been deceived by the touch; however, I can conceive that where the occiput is

very much reversed backwards, the chin may lodge upon some part of the pelvic circle, and compel the anterior part of the breast and neck to fix itself at the orifice, while the breech, although retaining its natural relations to the abdominal members, remains at the fundus of the uterus. In order, therefore, to avoid the reproach of abandoning one extreme for the purpose of falling into another, I shall admit the positions of the back, and of the anterior face of the thorax, as at least possible occurrences.

956. As to presentations *of the side*, they are too frequently met with for their existence ever to have been the subject of a doubt; but the classification of Baudelocque, although recently brought forward again in America by Dr. Dewees, one of the most distinguished accoucheurs in the New World, here requires the same reform as in the anterior and posterior surfaces. The sides of the neck form too deep a notch betwixt the shoulders and head, not to yield a passage to one of these parts; the side of the chest being less round, and particularly not so smooth as the point of the shoulder, could not hinder the latter from engaging in the os uteri; lastly the flanks would soon bring about a hip or breech position.

957. *Causes.* Inclinations of the womb or of the straits of the pelvis, sudden and irregular movements of the fœtus, certain attitudes of the woman long persisted in, are the principal causes to which, in the present state of our knowledge, we may attribute the bad positions of the fœtus.

958. Hippocrates was the first one to say that the fœtus in utero was in some degree situated similarly to an olive or a cork in a long-necked bottle; that in order to escape from the genital organs, it must present one of the ends of its long diameter; and that any other presentation was dangerous, rendered delivery impossible, and imperiously demanded the assistance of art.

This doctrine, which has been republished by all the authors since the father of medicine, and against which no one has made any objections even in our own days, is, notwithstanding, not free from all doubt.

The comparison instituted by Hippocrates is not correct, except in so far as the fœtus remains in a normal position; in the other cases, the child represents neither an oval nor a cone placed transversely or obliquely; whilst the head turns on one of its sides, behind, or in front, whilst the shoulders, the breast, or the back tends to engage, the remainder of the trunk continues, notwithstanding, in due relation with the vertical axis of the uterus, whenever the contractions are somewhat energetic; and thenceforth the fœtus is in no respect like a cork that presents crosswise in the throat of a vial.

959. No doubt the hand of the accoucheur is often necessary, and even indispensable, when it is neither the head nor pelvis that

presents; but it is also certain that the organism alone would, in many cases, triumph over this obstacle were the labour left to itself. People have in practice reasoned as if the positions of the trunk, when once determined, could never change. But daily observation proves that the different points of the fœtus, though very remote from each other, may, during a labour, present alternately at the orifice; that positions of the back or shoulder may be converted into positions of the head or breast; that positions in appearance the most unfavourable might sometimes be replaced by normal positions, were all accoucheurs *sufficiently well informed to know how to wait*.

960. Those passive movements undergone by the fœtus *in utero*, which Denman has mentioned under the title of *spontaneous evolution*, and which M. Murat calls *spontaneous version*, have been carefully observed by Madame Lachapelle, and noticed by Garthshore, Martineau, &c. Neither were the ancients wholly unaware of them, since they advise that, for the purpose of bringing the head back to the strait, the woman should be shaken or assume certain positions. Most modern authors have also remarked them since they have laid it down as an established rule, that the position of the child, while still enclosed in the membranes, is so variable, that, in order to fix it, it becomes necessary to rupture the ovum, choosing a moment when the head corresponds to the centre of the pelvis; but upon this, as upon all those phenomena that have not been the objects of special study and attention, little thought has been given to the practical consequences that might follow it.

961. Although the spontaneous evolution takes place most frequently where there is a superabundant quantity of liquor amnii, where the fœtus is not large, where the womb is very much inclined, or where the pelvis is badly formed, it may, nevertheless, be sometimes observed in the directly contrary conditions. Although it more commonly and easily takes place before the rupture of the membranes, it is, notwithstanding, found to occur after the evacuation of the waters: a young woman, in her second pregnancy, was admitted into the hospital of the *Ecole de Médecine*, at ten A. M. in the month of August, 1825. The os uteri was then but little dilated; nevertheless, I discovered that the shoulder presented in the second position. The waters were not discharged until three o'clock in the afternoon; four students, who were already well advanced, touched and recognized the presence of the shoulder, as I had done. I did not wish to bring down the feet; the pains were neither very strong nor very frequent, and I had some confidence in the assertions of Denman. At eight o'clock the shoulder was found to be evidently moved towards the left iliac fossa, and I could easily feel the ear to the right. At eleven o'clock the temple was nearly in the centre of the orifice: the

energy of the contractions was greater, and the os uteri completely effaced. At midnight the occiput came down, and in the space of an hour the child was expelled in the right occipito-acetabular position.

962. It appears to me that the explanation of *spontaneous evolution* is an easy matter: the head of the fœtus, which is its most solid, voluminous, and regularly rounded part, and on that account its most slippery portion, naturally tends towards one of the two extremities of the great diameter of the uterus, and towards the cavity of the pelvis; if, under the influence of any cause, it has assumed any other position, it is very natural that when pressed by the organ in which it is enclosed, it should gradually, and without much difficulty, reassume the situation it occupies when in its natural circumstances. When the womb contracts, if the fœtal ovoid is well situated, it becomes compressed equally in every direction, but if, on the contrary, it is in a deviated position, its extremities support almost alone the whole effort of the contraction, and but for the shoulder, which is, from its salient form, apt to be arrested at the strait, either the head or the breech would be almost always brought to the strait.

For this consequence to fail taking place, which is almost impossible, the middle of the child's body ought to correspond exactly to the centre of the pelvis, so that, of its two extremities, one should not be more disposed than the other to slide up towards the fundus, or down to the orifice of the womb; besides, the difference of the shape of the head and breech would render this equilibrium extremely difficult. There is nothing very extraordinary, therefore, in the evolution or spontaneous version of the child; it is quite a natural phenomenon, easily explained by the action of the womb and its relations to the form of the ovum and fœtus. The mechanism of this evolution explains why the anterior and posterior positions of the trunk are so rare, and shoulder cases so common. If, when some point on the dorsal or abdominal surface of the child offers at the strait, the head of the pelvis is too far removed from it to be brought back again, the pains never fail to act with a certain degree of force upon the two extremities of the bis-acromial diameter, which then becomes inclined, and one of the shoulders is soon compelled to engage in the open part of the strait.

963. To conclude, from the above details I think it follows:

1st. That all those positions of the trunk that cannot be referred to those of the shoulder, the back, or the anterior part of the thorax, ought to be classed among the inclined positions of the head. 2d. That shoulder presentations are, so to speak, the only ones that require particular attention, inasmuch as all others are naturally reduced to them. 3d. That the child is never situated completely crosswise in the womb, and that the most untoward positions may

sometimes be expected to be reduced to those that are most favourable. 4th. That there are a good many cases, in which the interference of art is any thing but indispensable, although the fœtus may present by neither end of its great diameter.

964. The *indications* to be fulfilled in cases of faulty position of the child necessarily vary according to a great variety of circumstances. Until the waters are discharged, nothing is to be done. We should wait for the dilatation of the os uteri: if the uterus is obliquely situated, we must endeavour to restore it to its natural attitude; should the head project over the hypogastric notch of the pelvis, it should be pushed backwards over the edge of the strait; when the fœtus is so movable that the head, the shoulder, or some other part comes to present successively at the orifice, it is proper, as has been said, to rupture the membranes without waiting too long, and choosing the exact moment when the head happens to be over the strait.

But if the os uteri is already sufficiently dilated, if the membranes are already ruptured or on the point of giving way, it is important to decide at once, whether or not the hand is to be carried into the womb. Denman tells us that we may dispense with doing so in a majority of cases, seeing that the womb, most generally, will bring about the *spontaneous evolution*, and that if the child should really come down doubled, its escape would not, on that account, be wholly impossible. The French accoucheurs think, on the contrary, that we ought to act immediately in all cases; for, say they, the longer we wait the more will the womb contract, and the more difficult will it become to enter it and effect the turning.

The conduct of Denman in this case does not appear to me to be of the very wisest; by imitating him, it is true, some fœtuses that we deliver by the feet might come away spontaneously, but many more of them would fall victims to such an expectant mode of practice, and which might be saved by operating in good time. As to delivering the fœtus double, it is manifest that it must be very difficult, that it will most generally not take place at all, and that the woman will be exhausted with useless efforts, and may lose her life; that even under the most favourable conditions of this kind, the child generally dies long before it is born, at least if we may judge from Denman's own cases, since out of thirty of them only one was born living.

Thus, although spontaneous evolution may take place, and rigorously speaking, some women may be delivered without it, it is nevertheless more conformable to the dictates of prudence and humanity to turn the child or apply the forceps. To this rule an exception should be made of those cases where the shoulder is not fully engaged, those where the vertex or the pelvis is near enough to the orifice to allow us to rely upon a fortunate transmu-

tation, and lastly, those where the introduction of the hand is so difficult that it would not be more dangerous to wait than to proceed at once to the operation.

TABLE III.

Anormal Presentations of the Fœtus.—Tokological Operations.

AUTHORS.	Number of Labours.	Breech.	Feet.	Face.	Knees.	Trunk.	Forceps.	Turning.	Cephalotomy.
Boer	6,555	126	68	58	—	—	38	39	10
Bland	1,897	36	18	5	—	—	9	9	10
Merriman	1,800	42	23	4	—	—	12	29	7
Madame Boivin	20,517	363	234	74	4	96	96	218	16
Madame Lachapelle . .	22,243	492	203	103	9	118	76	174	12
M. Nægèle	415	15	—	4	—	2	15	3	1
M. Nægèle	1,296	61	—	—	—	18	41	19	4
Total.	54,723	1135	546	248	13	234	287	491	60

CHAPTER VI.

OF OBSTETRIC OPERATIONS.

ARTICLE I.

OF TURNING.

965. THE word turning, is, in tokology, applied to the act of turning the child with the hand, and bringing one of the extremities of its great diameter to the superior strait. There are two kinds of turning; in one the head, and in the other the feet are brought down first.

Hippocrates has a few words upon the subject of turning, but only of version by the head. Celsus advises that the feet should be drawn down where it is too difficult to get hold of the head, but he dares not perform this manœuvre except when the child is dead. Aetius and Paul of Egina are the only ones among the ancients who have applied the idea of Celsus to the living fœtus; although it is mentioned in Wolf's *Collection*, and though Franco and Paré have treated of it as a common practice, we must come down as late as the time of Guillemeau before we can obtain any circumstantial details concerning it. Previously to the time of this last-mentioned author, all those practitioners who were either ignorant of, or refused to adopt the operation of turning by the feet, were reduced to the necessity of bringing away the child piecemeal from the womb, after having allowed it to perish, or else to extract it with the crotchet or some other instrument in all cases where they thought it not possible to bring the head to the strait. Besides, until then there never had been any question about bringing down the feet, except as a remedy for faulty positions, as positions of the body, for example. It is only since Guillemeau's day that it has been recommended to bring down the feet and make a complete version and delivery of the child, in cases attended with some accident, the head being already at the strait.

SECTION I.

Of Turning in general.

The necessity of acting with the hand to change the position of the fœtus or assist in its expulsion having been clearly ascertained, it should be communicated to the relatives or friends of the woman, and they should be informed of the dangers to which the child is exposed. Provided the case be at all doubtful, or if the family have not implicit confidence in him; if his age, or above all his reputation do not place him beyond the reach of the envenomed shafts of envy, it is well for the safety of all parties, that the accoucheur should request a consultation with one or more of his brethren, best known by their experience and knowledge.

966. As to the woman herself, she ought to be informed of the advantages of the operation, and of the evils of retarding it or of not performing it; but it is important that she should be kept in ignorance of the risks the fœtus is about to run, and the sufferings to which she is exposed herself. These precautions being taken, we should next think of what period of the labour we should choose for the operation; of the position most favourable for the woman and for the accoucheur, then of the position of the child, and lastly, determine which hand should be introduced.

967. *The time for acting.* As long as the membranes remain whole, and the orifice undilated, we may wait: if the labour is difficult only in consequence of the faulty position of the child, and the woman is in danger, it suffices that the orifice be soft and dilatable; we may operate. In all cases where the membranes are ruptured, there is not an instant to lose;* however, where the womb has been for a long time contracted, where there are great irritation, heat, fever, or any symptoms of inflammation, these epiphenomena ought to be first combated by bleeding, baths, sedatives, ointment of belladonna, &c., according to circumstances.

Upon the whole, the most favourable moment for turning is just when the membranes are whole and the os uteri completely dilated. This period ought, therefore, always to be chosen, if possible, and if there be no counter-indication present.

* M. Velpeau says "in all cases where the membranes are ruptured there is not an instant to lose."—Let not the young and inexperienced practitioner embrace this doctrine.—The rule is, that we may turn whenever we can do so without violence to the os uteri. All prudent authors concur in opinion that it must never be *forced*—gentle attempts to dilate, may be made from time to time—but as to absolutely forcing open an undilated and rigid os uteri—the *attempt* would be worthy of condemnation. Hence in fact, the operation must be determined by the judgment of the attendant—always using as his watchword, *no violence.*—M.

968. *Position of the woman.* Should it be necessary only to bring back the head or buttocks, in case of deviated position of those parts, to the superior strait, we might indeed leave the woman upon her common bed ; or in the situation she had occupied on her little bed during the pains ; but whenever it becomes necessary to seek after the head or feet at some distance from the vulva, we ought to act differently ; however, the essential point on this subject is that the vulva and perineum shall be completely at liberty, and that nothing about the pelvis shall be left to interfere with the movements of the accoucheur, and that the muscles shall not require to be put in tension for the support of some other parts of the body. Thus, she may be placed on her side, conformably to the precepts of the English and American practitioners ; on the edge or foot of the bed ; on the knees of some strong person ; on a chair, a settee, a table, or any piece of furniture suitably prepared for her. Upon the whole, her attitude ought to be like that of a patient during the operation of lithotomy.

969. At the *Maternité* at Paris, and the Strasburg Hospital, one side of the lying-in-bed is placed against a wall ; as soon as an operation becomes necessary, the woman places herself crosswise upon it, with pillows under her head and shoulders, towards the wall ; the sacrum rests upon the free edge of the bed ; an assistant is placed on the outside of each leg, and charged with the duty of keeping them separate, and the legs and thighs flexed, while a third is prepared to hand any thing that may be wanted during the operation. If they can be disposed of, other assistants secure the pelvis, and prevent those disorderly movements which the sufferings of the woman sometimes deprive them of the power of controlling.

970. The same conduct may be followed in private practice, but it appears to me better to slip the mattress down so that the folded edge may correspond to the foot of the sacking-bottom. The woman is then in exactly the same condition as before, and the assistants can more easily move round about her. It should be observed, that many women are so courageous that it is not necessary to support either the legs or the head, and indeed two chairs or two stools, fixed so as to support the feet, might serve instead of assistants to hold her legs, if assistants are wanting.

There is no fixed rule as to the height of the bed ; but it is well to pay some regard to the stature of the accoucheur, the degree of inclination of the axes of the straits, and perhaps also to the stage of the labour.

971. *Position of the accoucheur.* If the bed be a low one, the accoucheur may sit down or kneel upon the floor. Nevertheless, a standing posture is unquestionably the best, and whenever there is a necessity for using much power, it should be preferred. The

precept of Levret on this subject has long been forgotten, which was thus: "the accoucheur should stand up, with his legs separated at an angle of forty-five degrees, one foot being placed forwards, and the other backwards; that he should have the spine bowed, and lean with the hand that he does not operate with upon some solid substance."*

All this, says Roussel, may be called mechanics and geometry by an operator who wishes to shed lustre on his art, but certain it is, that a simple midwife, by relying upon her native dexterity, absolving herself from the constraints of a prescribed position, and executing all the motions that may be required by circumstances rather than those demanded by the rule, will operate better than an accoucheur, no matter how gravely he may straddle his forty-five degrees.

972. Taking off the *coat*, rolling up the *sleeves*, and putting on an apron has seemed too grotesque to many moderns, who think that the woman might be frightened by so many preparations, and they ought, therefore to be dispensed with; people may declaim after this sort as much as they please in the study, but by the lying-in bed it is otherwise.

In fact it is not merely for fear of spoiling it that the accoucheur ought to take off his coat, but because, unless he does so, the movements of his arms would not be free enough to permit him to manœuvre conveniently, and penetrate to the fundus of the womb. As to the apron, it may doubtless be dispensed with: but what harm can it do, and why is it more frightful here than in a surgeon making his visits, or preparing for an operation?

Some cloths to put under the feet, some napkins to wipe his hands and arms when they become soiled, warm water, Cologne-water, some vinegar, and a little good wine, in case the woman should be likely to be ill, are also necessary previously to commencing the operation. Moreover, the condition of the fœtus must be attended to, its position ascertained, and the hand to be introduced to be decided upon.

973. The *christening* or provisional baptism is only applicable to a living child, and that, provided it be not a monster. Where there is ground to fear that it is dead, we should say, "*Child, I baptize thee &c.*, if thou art living;" and where there is reason to suspect it of being a monster, we substitute for *if thou art living*, the words *if thou art worthy of being baptized*. In order to bap-

* If a woman lie upon her back for this operation, the practitioner has equal access to the uterus with the right or left hand, the former of which is to be used in occipito-posterior positions, and the latter in the occipito-anterior. If she lie on the left side, the left hand is applicable for the occipito-anterior, and the right for the occipito-posterior positions. But the right side is equally convenient if we use the left hand for the occipito-posterior, and the right one for the occipito-anterior position; it is of little consequence, therefore, which of the three attitudes is taken by the patient.—M.

tize, some part of the naked surface of the child should be touched, if not with the fingers, at least with the water of christening, which it is sometimes necessary to inject to a considerable distance.

This precaution, which, as is manifest, belongs to the dogmas of religion, ought never to be neglected with persons who make of it an article of faith. Whatever be his personal belief, the physician ought to respect the opinion of the families he attends, whether they agree with his own or not; and to me nothing seems more blameworthy than those pragmatical practitioners who, under pretence of reforming consciences, openly revolt against every custom that does not square with their own way of thinking.

974. *To ascertain the position of the fœtus.* The positions of the head, the feet, the knees, and the breast, having been characterized in the article on eutocia, I have now to attend only to those of the trunk.

Presentations of the shoulder, whether frank or inclined, will, if the arm have not come down, be ascertained by the rounded form of the tumour in the orifice, by the presence of the clavicle, the ribs, the scapula, and one side of the neck.

When the arm escapes first, it not only indicates that the shoulder is at the superior strait, but it also teaches us to which side of the pelvis the vertex and also the face are turned. The thumb corresponds to the summit of the head, while the palm of the hand answers to the abdominal surface. However, it is important to know, that instead of being in a state of supination, or even of slight pronation, the hand and the whole limb may be twisted in a contrary direction, and especially into forced pronation; so that previously to giving a definitive judgment, it is best to slip some of the fingers into the vagina, along the cubital edge of the arm, as far as the arm-pit, so as to make sure of its relative situation.

If the *back* should stop at the centre of the strait, the range of the vertebral spines and the ribs would suffice to point it out. The absence of ribs in the lumbar region, or on the one hand the hips, and on the other the scapulæ and back part of the neck, might serve to show which way the head is directed.

The sternum, the ribs and clavicles, above which we can also sometimes feel the front of the neck, indicate presentations of the *anterior face of the thorax*.

Where the os uteri is largely dilated and the membranes ruptured, and the presenting part is not too high up in the pelvis, and has not had time to swell and alter its shape under the influence of the uterine contractions, it is in general pretty easy to distinguish the different positions of the trunk from each other; it is at least always possible to avoid confounding them with those of the head or pelvis; but in the contrary circumstances, the most

consummate experience is sometimes deceived, and it is often impossible to establish a certain diagnosis until after having carried the hand into the womb.

975. *Choice of the hand.* Where the bag of waters is still unbroken, or the fœtus retains a considerable degree of mobility, it is useless to delay about the choice of a hand to operate with: the one that is most easily used is to be introduced, or the one which habitually brings down the child in the least unfavourable position; where the position has not been ascertained, or is merely a matter of doubt, the practitioner ought to act in the same manner, or may make use of the hand commonly employed in operating for those positions most frequently met with; if, however, there should occur any difficulty after reaching the womb, it is best to withdraw it, and introduce the other hand.

In cases where the presentation is well determined, we may know at once which hand is most favourable to the success of the operation; this is moreover liable to vary according to the kind of manœuvre about to be executed, or which it is indispensably necessary to attempt.

976. For those inclined positions of the head and breech which do not require immediate version by the feet, the left hand ought to be preferred. Whenever the deviated parts correspond to some portion of the right half of the pelvis, the right hand, on the contrary, in the opposite deviations, and either of them, indifferently, if the deviation takes place directly front or back. The cephalic version ought to be subjected to the same rule of practice.

977. For the feet, knees, or breech, those positions in which the posterior surface of the fœtus looks towards the left side of the pelvis, are best operated on with the left hand, and the inverse positions with the right hand, although it may be most frequently in our power to do just the contrary if we please.

978. When the vertex presents first and we have to bring down the feet, the left hand is most suitable, in left occipito-pelvic positions; that is, the first and fifth of Baudelocque. (First, and fourth of MM. Maygrier, Capuron, Dugès, &c.; first, fourth, and fifth of Madame Lachapelle; left-occipito-acetabular, and right fronto-acetabular of M. Gardien.) The right hand, rigorously speaking, is only for the diametrically opposite positions; but as it terminates a labour in the first position of the feet, as it is more handy from customary use, and as it manœuvres as well as the other in median positions, it ought to be selected for all the right and antero-posterior positions.

979. In shoulder presentations we may lay it down as a general rule, that the left side requires the use of the left hand, and that the right hand should operate in the positions of the right shoulder.

980. Lastly, we ought to make use of the right hand in pre-

sentations of the sternum, or back, whenever the head is not turned to the left, and of the left hand in the opposite case.

981. These general rules appear to me to be simple, applicable to all cases, and easy to be understood. Baudelocque, Madame Lachapelle, M. Dugès, M. Désormeaux, and very recently, M. Major, of Lausanne, also, have advised us to introduce that hand *which, when in a state of semi-pronation, will have the palm turned towards the front of the child, and the fingers towards its lower extremities*; but this rule is too vague, and liable to too many exceptions for it to be used in practice. It is not perfectly exact, either in positions of the pelvis, or those of the back or shoulder, and in positions of the head and sternum it is only suitable in the first stage of the operation.

Those who have recommended the introduction of the hand that is naturally turned towards the side of the pelvis where the feet are situated, did not observe that it most commonly happens, even in shoulder positions, that the feet remain up towards the fundus of the womb, without being sensibly inclined to one side more than to the other; neither did they remark that precisely the contrary rule is followed where the pelvis presents first.

When M. Gardien says that the right hand is required in all those cases where the feet are to be brought down in the first, and the left where they are to be brought down in the second position, he has approached nearer to the truth, although his assertion is not correct either except for positions of the head and trunk; but he has rather expressed a fact than endeavoured to lay down a rule, which, however, naturally follows from the principles that I have indicated above.

Dr. Breen advises us always to use the left hand, inasmuch, says he, as the right is infinitely more commodious in assisting the action of the other in pressing upon the hypogastrium. M. Major thinks that we can manœuvre with the same hand in all kinds of positions, but always in conformity to the rule indicated above. For this end we have only to vary the posture of the woman, to place her on one side or the other, or on the back or abdomen, accordingly as the abdominal surface of the fœtus, for example, looks to the right, to the left, in front, or to the rear; but I do not see what advantage such a course can have over the one generally pursued in France.

982. Now the hand being chosen, in order to let it slip easily through the passages, render its introduction easy, and guard against the infection of contagious diseases, we should cover it with some fatty or mucilaginous substance. It may be immersed in oil or mucilage, greased with butter; lard, or the white of eggs, &c., may be used: whichever of these substances is selected, it seems to me right always to follow the counsel of Rœderer, that is to say, only to anoint the back of the fingers and hand, which

alone exert any friction upon the parts of the mother, while the other surface of the hand has to do only with bodies that are already but too slippery. The forearm ought also to be greased as far as its upper end: if the part of the child we are to pull by were at the vulva, or not high up in the vagina, this precaution might be rather injurious than useful, and the hand should be applied quite dry.

SECTION 2.

Version by the Head.

983. Long imbued with the idea that the positions of the head were the only ones which admitted of a fortunate delivery, physicians only thought, in the first place, of restoring that part to the straits, when the child presented otherwise than by the head: the precept of Hippocrates was followed, and they endeavoured to bring down the head not only in positions of the shoulder and other regions of the trunk, but also in those of the breech, knees, and even of the feet themselves, which were then looked upon as very dangerous. Celsus showed that the fœtus might escape with its lower extremities foremost; but version by the head was not the less regarded as the safest and most practicable process, until the time of Franco and A. Paré. Since the time of Guillemeau, on the contrary, it has been almost wholly abandoned, and at present the standard authors scarcely mention it, except for the purpose of condemning it. Notwithstanding what a few modern authors have said about it, no person in France has felt it a duty to put it in practice. The objections urged against it are the difficulty of its execution, the smallness of the hold afforded by the head to the hand that attempts to seize it, and the impossibility of bringing it back to the strait, where the womb is ever so slightly contracted upon the child; that even in the most favourable cases, where turning is once effected the hand cannot assist in the delivery, which must be left to the powers of nature unless recourse be had to the forceps; whereas, by acting upon the feet, it is an easy matter to extract the fœtus without employing any instrument but the hand that brought them down. Lastly, that as delivery by the pelvic extremity is almost as natural as by the head, it is evidently preferable to turn and deliver by the feet; and that it is the only method that ought to be attempted where it becomes proper to change the position of the child.

984. To the above, I answer: 1. That it is not always very difficult to take hold of the head while it is in the womb, not to exert a considerable degree of power on it where that may be required; 2. That unless the waters have long been discharged,

we may often succeed, without much difficulty, in laying hold of the occiput, and bringing it down to the strait, no matter how far it may have been removed therefrom; 3. That in this operation we have not so much to catch hold on the head and compel it to descend, as to push up the part that has engaged in its place; 4. That far from being a simple and desirable case, a delivery by the pelvis, on the contrary, exposes the child to the greatest danger, while that by the vertex, even when assisted by the forceps, is rarely dangerous. M. Flamant seems to have been the first to introduce it in our day, notwithstanding what Osiander says about it, who has attempted to divide the credit of it. In fact, the German professor did not describe it until 1799, whereas it was taught at Strasburg in 1798; since that time much attention has been paid to it in the north of Europe, and MM. Labbé, Eckard, Wigand, Schnaubert, Siebold, d'Outrepont, M. Wenzel, Busch, Carus, Ritgen, Schweighaeuser, Toussaint, Vallée, Deroche, and Ubersant, have expressed themselves more or less at length upon turning by the head, and endeavoured to diffuse the principles laid down by Professor Flamant.

Cephalic version may, therefore, be attempted, 1. In a well-formed pelvis, where no other accident has happened except the vicious position of the fœtus, and the head is found in an inclined position in the vicinity of the strait; 2. In presentations of the shoulder, back, or anterior part of the thorax, provided the arm is not prolapsed, and the uterus not too much contracted. Lastly, it seems prudent to try it whenever the feet are farther removed from the strait than the head is, and where it is probable that the labour would terminate spontaneously if the head were at the strait. Moreover, after having attempted to perform it in vain, we are not prevented from still proceeding in search of the feet, which can be as readily found after as before the attempt has been made; if the head seems disposed to come down, we may endeavour to bring it down; if not, we have only to direct the hand towards the feet. I do not think, however, that this kind of turning ought to be preferred in the inclined positions of the pelvis, nor, *à fortiori*, where the breech presents fairly. MM. Flamant and Schweighaeuser wish it to be preferred in all cases, even where there are accidents on the part of the mother, because, when the head is once brought to the strait, it can be laid hold of with the forceps. Perhaps they might be imitated with advantage in some cases where the fœtus is very movable in the uterus; but I doubt if it be possible where the waters are gone off, and the womb strongly contracted on the child.

985. Thus, the woman being placed as has been directed, the left hand is introduced if the head is to the right, and the right hand, on the contrary, if to the left; and either one or the other

almost indifferently, if the vertex is turned in front or directly behind.

In the first place, the part that is engaged is to be pushed upwards; we should try to remove it from the strait, and direct it towards the iliac fossa that is opposite to the one occupied by the vertex; in this way the womb is enabled to exert its power on the head and return it to the centre of the pelvis. After having thus raised up the shoulder, if the head does not descend, it must be sought for with the hand, and taken hold of with all the fingers, which draw it down as with a crotchet, and at the same time endeavour to make it assume, in preference, one of the occipito-anterior positions. When the head has been brought to the centre of the pelvic circle, it is left there, and the delivery requires no further assistance, provided there be no other accident in the case; if the contrary should happen, the forceps should be immediately substituted for the hand.

Wigand, in speaking of cephalic version, says that we may often succeed in operating without introducing the hand into the genital organs; he thinks that by acting upon the womb through the abdominal parietes, and assisting it by the posture of the woman, we may most commonly bring back the head to the superior strait. Before I was acquainted with the doctrine of the German professor, I had already followed this precept, and have in conforming to it found that it is, in fact, sometimes possible to restore to the vertex its natural position; but I do not think that this manœuvre can ever be of much use where the waters have been long discharged, and the womb strongly contracted on the child.

SECTION 3.

Of Turning by the Feet or Pelvis.

The manœuvre in turning by the feet consists of three principal stages. It is necessary, 1. To introduce the hand; 2. To change the position of the child; 3. To assist in the expulsion of the ovum.

These three stages are never found together in turning by the head, where, as has been already seen, the action of the hand is of no further use after the head has been properly placed at the superior strait; in some of the feet positions the *manœuvre* is almost wholly confined to the stage of extraction.

986. *Introduction of the hand.* Many authors advise us to penetrate into the vagina at the very moment of a strong uterine contraction; in this way, say they, the pain produced by the operation becomes confounded with the pain of the contraction, and the woman does not distinguish them apart; then also the vagina

is both enlarged and shortened by the temporary descent of the womb, which in some sense comes down to meet the hand. In theory these assertions may be very correct; but in practice they certainly do not authorize the precept which it has been attempted to draw from it, and, like M. Désormeaux, I think, from my own experience, that the hand should generally be passed through the vulva in the intervals between the pains.

Whatever mode be adopted on this point, the fingers being placed side by side, must first be introduced in the direction of the length of the vulva; after which they are brought together in such a way, that their palmar surface forms a kind of gutter, in which the thumb is lodged, so that the whole may form a very long cone, the base of which is found at the place of the metacarpophalangeal articulations. The hand thus gets into the vaginal cavity, following the direction of the axis of the inferior strait.

987. In order to penetrate through the os uteri, it is absolutely necessary to choose a time when the pain is off, so much so, that nobody has ever dared to prescribe the contrary. Otherwise, indeed, it would often be impossible to get into the uterus; there would be a risk of lacerating the orifice; in fine, it would be voluntarily to create a thousand difficulties, and to expose the woman to numerous dangers.

If the dilatation is very much advanced, the fingers, which are at first held together, should be almost immediately more or less separated, so as to accommodate them to the form of the part that presents, and allow them to slip easily between it and the parietes of the womb. In the contrary case, they are to be introduced one after the other, and the cone formed by their junction is soon reproduced. They are then gently passed onwards, taking care to stop upon the recurrence of each pain, and always move in the axis of the superior strait. Here it is above all important not to be in a hurry: for the movements and the efforts require the greatest gentleness; instead of pressing forwards to dilate the os uteri, it is sometimes better to separate the base of the fingers moderately and by degrees, or at least the portion of the cone already introduced into the orifice. During this manœuvre the other hand should be applied to the patient's hypogastrium, for the purpose of supporting the uterus, and inclining it backwards or to one side, if necessary. As soon as the roots of the fingers have passed through the os uteri, the whole hand enters without difficulty into the uterine cavity, and thenceforth the intromission is effected.

988. *Period of exploration.* Before proceeding any farther the state of the case must be ascertained; we must be sure not to be deceived as to the position of the fœtus, not to confound the arms with the legs, to see if any part is twisted out of its proper position, and endeavour to learn where is the feet or breech after having first recognized the head. Then, to get hold of the child

for the purpose of extracting it or changing its position, it is essential to remark, that several points of its body could not bear the degree of pressure which it is sometimes found to be necessary to exert. For example, we ought to avoid pressing the ends of the fingers upon the sutures, the fontanels, the abdomen, and sides of the thorax; for the purpose of pushing up, turning, or extracting the fœtus, we ought to apply the hand only to the forehead, the occiput, the temples, the parietal bones, the shoulders, the spine, the sternum, the hips and the limbs.

989. *Mutation.* After having ascertained the part that presents, it is pushed up to free the superior strait, taking care to apply the fingers to a surface as extensive as possible; then the feet should be sought for, seized and brought to the orifice. The fœtus must never be brought down otherwise than in conformity to its natural flexures; that is to say, it must be rolled up, on its anterior surface. By turning it over backwards, it would necessarily be brought in the direction of its extension; it would soon become an inflexible trunk, or arc of a circle, which most generally would render the remainder of the operation impossible; the uterine cavity would not be sufficiently spacious to admit of the evolution, and the least force would hazard the luxation or fracture of the limbs, the rupture of the spinal marrow, and would give rise to extremely severe pains on the part of the woman, and perhaps even to lacerations of the uterus.

Whilst engaged in exploring, and turning the child, it is not less essential to support the womb outwardly than it is during the time of intromission. The hand that is held applied to the hypogastrium may aid also by suitable pressure in causing the head, the shoulder, or the limbs to descend, which renders the turning in all respects easier and surer; but for this precaution, the accoucheur would be liable, when compelled to exert a certain degree of force, and particularly where the liquor amnii has been long discharged, to produce dangerous stretchings, to separate the vagina from the cervix, to rupture the womb itself at some weak part, or at those points where the womb is most strongly contracted on the projecting and solid part of the fœtus.

These manœuvres ought always to be executed in the intervals between the pains; they would be excessively dangerous if performed during the contractions, and would generally occasion fatal lacerations to take place; besides, it is often impossible at those times to move the fœtus; the hand soon becomes so compressed that it is quickly benumbed, and completely loses all its powers of sensation and motion; as soon, therefore, as a pain appears, all exertion is to be suspended; it should not be begun again until the contraction has ceased, unless, however, some serious circumstance necessitates a very prompt termination of the labour.

I ought, also, to warn the young practitioner, that in order to reach the fundus of the womb, the arm must be introduced much farther than he would at first suppose, and that to get into the axis of the superior strait, the hand should be much more inclined forwards than would be imagined upon the inspection of a dried pelvis.

Most accoucheurs have recommended and still advise that the feet should be seized, and not any other part of the limbs; in fine, the feet are the only parts by which we are advised to pull, in the kind of turning under consideration. Nevertheless, it is possible, it is in many cases even advantageous, to follow the counsel given first by Burton, reproduced by Delpech, and very recently again by Dr. Breen—that is, to take hold of the knees* or hams, rather than the feet.

990. *Extraction.* When the mutation has been completed, and the child reduced to one of the positions of the extremities of its great diameter, we may stop, provided the pelvis be well formed and the womb retains sufficient energy to terminate the rest of the labour. This is the way we are compelled to act in all cases of version by the head, unless we choose to apply the forceps; but when the feet are brought down, ought they also to be abandoned after they are placed in a situation which no longer prevents the spontaneous delivery of the child? To authorize this advice it has been supposed: 1. That pulling on the child ought always to be avoided when not absolutely necessary; 2. That tractions force the arms to rise along side of the head, which prevents its advance, and that they almost always place the occipito-frontal or occipito-mental diameters in the situation that ought to be occupied by the occipito-bregmatic; 3. That in rapidly passing through the os uteri, the belly and breast of the fœtus are subjected to too sudden a compression; 4. Lastly, that the womb, being too suddenly emptied, may become inverted, fall into inertia, and give rise to hemorrhage, &c. All these inconveniences are real, and nothing would be so easy as to enlarge the list: but on the other hand, it should not be overlooked that the woman submitted to the operation only for the hope of being soon delivered; that her family and attendants cannot be satisfied until the child is completely expelled; that, in case of abundant hemorrhage, of syncope, of lipothymia, convulsions, premature descent of the cord

* It is quite as well to turn by the hams as by the feet—I, at least, have found it so. It should be remarked, that where any considerable difficulty is experienced in the exploration for both feet, it is perfectly safe to draw down only one; the turning is easily effected and the fœtus is actually safer, because if only one foot is employed for the *mutation* and extraction, the other one is folded up on the child's body, which makes of the case a sort of breech presentation. The head is extracted more easily the greater the dilatation of the parts effected before the head comes to the opening. I speak from experience.—M.

and exhaustion, we have no right to wait; that inertia ought rarely to occur in such circumstances, seeing that the manœuvre is better calculated to remedy than produce it; that the compression of the abdomen, when the hand has been previously introduced into the womb, ought not to inspire any great alarm; that, at least, it is scarcely more to be feared where we draw the fœtus down by the hand, than where it is simply pushed down by the efforts of the mother; lastly, that it is possible to avoid one extreme without falling into another, and that it is as dangerous, in the practice of midwifery, not to act apropos, as to do so without any necessity.

A well-informed and prudent man will therefore preserve a just medium, and proportion his manœuvre to the circumstances of each particular case. If not pressed by any important circumstance, he will wait, and excite the uterine actions so as to draw the child downwards concurrently with them, for the two actions ought to be so combined as to constitute, as it were, but one; at each pain the womb ought to commence before the hand, and finish after it. By pursuing this course we imitate a spontaneous delivery; the arms sometimes descend before the head, which continues bent down upon the breast, and the occipito-bregmatic diameter does not lose its natural relation to the strait of the pelvis; it is in no case indispensably necessary to pull hard enough to rupture the spinal marrow or detruncate the fœtus. If, on the contrary, there should be no other chance of safety either for the mother or the child, than in a prompt delivery, and should the contractions of the womb be too slow and feeble to admit of his relying upon them, the tractions performed by the accoucheur ought not only to assist, but they should more or less become the substitutes of the powers of the woman: there can be no hesitation in such a case; of two unavoidable evils we must choose the least. I need not repeat that in the former as well as in the latter case the tractions ought to be performed with great caution; never by jerks, and always in the axis of the straits.

To conclude, extraction may be considered under two principal points of view: 1. As a mere accessory power added to that of the womb, and which hastens the termination of a painful function; 2. As a principal, or even sole resource, in cases where the organism is powerless, or where it is of importance to empty the uterus within a few minutes. This distinction being once established, I do not see how any discussion can afterwards arise as to whether the child may or may not be pulled downwards after it has been turned. As long as the tractions are confined to the part first assigned to them, it is evident they can be only of service, and no well-informed man will ever make use of them in the other way without a clearly understood necessity for so doing.

§ I. OF BRINGING DOWN THE FEET WHEN THE HEAD IS AT THE ORIFICE.

Relatively to turning by the feet, the positions of the head ought to be reduced to two: the left occipito-iliac, to which we bring the first and fifth of Baudelocque; and the right occipito-iliac, which comprises the second and fourth of the same author, to which also we ought to bring the occipito and fronto-pubic positions, should they be met with.

991. The first of these requires the left hand, and the right hand is preferable for the second.

A. *Left Occipito-Iliac Positions.*

992. The *left hand* enters the vagina in a state of pronation, passes along the anterior face of the sacrum, penetrates into the orifice, and if the occiput is turned directly to the left, remains in a state of semi-pronation, approaches a state of supination if the vertex is in the first position, but must be held quite prone if the vertex is turned backwards and to the left, &c. The head is to be taken hold of and held in the hand, and not merely with the points of the fingers. The thumb is placed on the right temple, or parietal protuberance, and the other fingers, being more or less separated, are applied to the face and opposite temple.

At first this part is thrust upwards and along the axis of the superior strait, that is to say, upwards and forwards; it is afterwards rejected towards the left iliac fossa, taking care to favour this movement, with the right hand, which being placed upon the hypogastrium, sustains the fundus of the womb, and inclines it more or less backwards and to the right.

993. Now is the time to go in search of the feet; for this end the hand may pass along the anterior surface of the child, and arrive directly at the knees, or at the roots of the thighs; this is the shortest route; but by following it we are liable to several errors, in short, to mistake the elbow for the knee, the foot for the hand, the arms for the legs, and the safest way is to act in the following manner: we begin by extending all the fingers, and the thumb also, towards the left side of the head; they ought to be placed side by side, and extended in order to occupy the least possible space; they are then passed over the whole of the left lateral surface of the child, by sliding along behind the neck, the shoulder, the breast, the flank and the hip; during all this time the anterior part of the wrist supports the forehead and prevents it from descending again into the strait; the other hand pushes the womb backwards as much as necessary or possible, and endeavours to bring the parts we are trying to get hold of as near as possible to the fingers.

994. If the legs are in their natural state of flexion, we endea-

vour to carry the whole hand, flattened, above and behind the breast, turning it more and more into a state of pronation as we proceed; if they are, on the contrary, turned out of the way or displaced from their natural positions, if it appears too difficult to envelop their posterior surface in the palm of the hand, we should take hold of both of them if possible, or at least that one which is nearest the posterior surface of the womb, embracing their root with the thumb which is fixed in the groin, and with the fingers which are kept upon the posterior surface of the thighs. Should they be twisted or crossed; should one of them be found flexed; and the other extended; finally, if we have attempted in vain to get hold of them both together, and should be obliged to bring them down one after the other, we should at all events carefully try to bring down the posterior limb first, even although it should be the most distant one from the orifice.

995. In the first case, to continue the operation the hand has only to slip along behind the thighs and legs, which it pushes before it, extending them as they come down; in this way the feet can neither escape nor deviate, and may be conducted without difficulty to the superior strait.

In the second case, more difficulty is generally met with; we are sometimes obliged to act successively on the thigh and leg as if they were levers of the first kind; while we are searching for one foot the other escapes, and it is always a difficult matter to draw them both down together, unless we have been so fortunate as to get hold of the hams with the fingers and thumb at the commencement of the search.

In the third case, that is to say, when the limbs are far removed from their natural attitude, and always when we are obliged to bring them down one after the other, we act as we best can; only we should, while pulling at the leg first got hold of, endeavour to make it approach the opposite limb; by abducting it, which is naturally a very limited motion, and which would expose the child to the risk of luxations or fractures, we should also have the disadvantage of fatiguing the uterus far more than by following an abductive movement for its free exercise; also, the last-named movement requires much less space than the other.

996. However it may be, when one of the feet has reached the vagina or the vulva, it should be secured by means of a fillet previously to going in search of the other; not with a view of hindering it from mounting upwards again, as some of the ancient authors imagined, but only that it may be found again, when wanted. This precaution being taken, the left hand is again carried into the womb; and that it may more readily reach the other foot, it should follow along the inner and posterior surface of the one held in the fillet; by conforming to this rule we necessarily meet with the crease of the breech and sexual organs, the thigh we are in

search of cannot now be mistaken, and we thus avoid a good deal of tiresome feeling after an object. It ought to be well understood that this foot is to be brought down in adduction, by following the anterior surface of the *fœtus*, and the side of the other leg.

After having succeeded, in any way, in extending the legs, and bringing them down into the excavation, we place the index between them above the inner ankles, while the thumb and the other fingers are applied to their outer surfaces, and in such a way that the heels lodge in the palm of the hand. If the head, forced down by the womb, or ill supported by the wrist, should have approached too near the orifice, we should, before we pull the feet down, and without letting them go, push it up again towards the left iliac fossa with the thenar.

997. The first object of the tractions now to be performed, is to turn the child, to compel the head to rise up towards the fundus of the womb, whilst the pelvis is drawn into the superior strait, and to convert one of the left positions of the vertex into one of the right positions of the feet; that this mutation may yield all the advantages we are authorized to expect from it, the back of the child must always turn to the right, then a little in front, but never backwards. Consequently, the operator will carefully avoid inclining the hand in supination, after he has begun to pull on the legs; he should keep it in semi-pronation, to reduce to the second position of Baudelocque; and even if that should not suffice, he ought to try to get the right foot, which is in front, with the right hand, and draw down solely, or almost solely, by it, until the tendency of the back to direct itself backwards shall have been overcome.

998. As soon as both of the feet have passed through the vulva, they should be wrapped in a dry cloth so that they may be held more firmly. The hips soon pass through the orifice, and present at the inferior strait. As the limbs come forth, the hands, which are applied, the right one in front and the left one behind, ought to extend along them towards the vulva, so as to hold them by as large a surface as possible; the thumbs are therefore placed behind; the two last fingers on the anterior surface, and the index and medius extended on the outside of each leg or each thigh, until the hips shall have been born.

999. Before proceeding any further, it is proper to attend to the umbilical cord, to see that it be not stretched, by carrying the index and the thumb, or two other fingers of the right hand, towards its insertion on the belly of the child. If it should be found tense, a loop of it of sufficient length should be brought down by pulling the placental portion, but never by pulling its abdominal portion; if it is found not to be stretched any about the navel it may be let alone; if it should proceed from the navel down betwixt the thighs and then mount up along the child's back, so that the circulation

should appear to suffer, it ought to be disengaged, and even divided, should the danger appear to be pressing, and no other means of disengaging the limbs be discoverable ; but after that the labour ought to be terminated within a very few minutes.

1000. We continue the tractions obliquely downwards and backwards, that is to say, in the axis of the superior strait. As the hips are disengaged they are in turn taken hold of, the left or posterior one with the left hand, and *vice versa*, but in such a way that the fingers are not applied higher up than the cristæ of the ilia, so as to avoid pressing upon the abdominal viscera. The belly and the breast soon follow ; this is the time that the arms rise upwards, that the shoulders engage, and that it is essentially important to combine the efforts of the accoucheur with those of the woman, in order to avoid a departure of the chin from the breast. Whatever resistance may be met with in engaging the shoulders in the excavation, we ought never to imitate those routine practitioners, who, while they are pulling the child downwards, can never think of any thing better than to make it revolve on its axis, or make its whole body perform a more or less extensive movement of circumduction ; neither should we move it alternately from the internal surface of one thigh to that of the other, nor raise and depress it by turns from sacrum to pubis and *vice versa* ; such manœuvres could not do any good, and would stretch the dorsal or cervical portions of the spine too dangerously ; when it is found insufficient to draw downwards in the direction of the straits, it may be barely proper to try the effect of diagonal tractions, that is to say, we may pull downwards towards that oblique diameter, which at the superior strait corresponds to the greatest diameter of the shoulders. In the first place, while continuing to pull gently, we raise up the child's pelvis, as if we intended to carry it towards the mother's left groin ; it is then depressed towards the right sacro-sciatic notch ; afterwards we continue to raise and depress it, until the shoulders, which in this way engage one after the other, and receive the greatest part of the force employed, are near enough to the inferior strait to be easily got hold of ; when the child has advanced thus far, we must attend to the extraction of the arms.

1001. When the child is small or the pelvis very large, the presence of the arms offers but a small obstacle to the escape of the head, and we ought, properly, to abstain from disengaging them ; but in all other cases, they could not fail to embarrass the rest of the operation, and prudence, if not an indispensable necessity, requires that they should be brought down. Some authors have said, that when applied alongside of the neck, they facilitate the passage of the head, the dilatation of the vulva, that they obviate the contraction of the uterine circle, and the strangulation of the fœtus, and that they are never so large as to prevent the

delivery from taking place; but as this opinion is not founded on any plausible reason, it does not deserve the trouble of being opposed, and at present no one follows the practice.

The member nearest the sacrum must always be extracted first; should we begin with the other, we should meet with great difficulty, and when we had succeeded, the other arm would not be found to be at all more free.

1002. The trunk, which should always be wrapped up in a cloth, is supported by the right hand, as it is performing the oblique tractions. The left thumb, in a state of pronation, is placed in the hollow of the corresponding axilla, while the index and medius are applied to the outer and anterior surfaces of the arm, as far as the bend of the elbow, as if to form a tackle for the humerus. We then act upon the whole arm as upon a lever of the third kind; the thumb represents the fulcrum, the fingers the power, and the resistance is found in the forearm of the child. While we are thus acting on the arm to bring it down, it must be carried in the direction of abduction, so that as it sinks down it may slide over the fore part of the breast. If we should be content with hooking it with one or two fingers, we would run a risk of fracturing the bone, or at least of exerting the force only upon the shoulder-joint. When the whole shoulder is much elevated, it is sometimes found advantageous to follow the advice of Baudelocque, which has been repeated by almost all the accoucheurs of our own day, namely, to divide this little operation into two stages, to put the hand, at first in pronation, so that the thumb may for an instant take the place of the other fingers, and operate in succession upon the whole limb, beginning at the root of it; but this precaution is most frequently unnecessary, and I have had no occasion to repent of having generally neglected it.

The arm having been brought down, it is to be extended along the side of the thorax; the right hand deposits the trunk of the child in the left hand, and then proceeds to disengage the anterior or sub-pubal member, according to the method indicated above.

1003. Instead of following their natural tendency to rise up alongside of the head, the arms are sometimes turned backwards, and that in two different ways: 1. One of them, or both, but generally only one, and especially the one that ought to be found in front, is fixed behind the neck, so as to arrest the progress of the occiput; 2. Previously to rising upwards, or even while in the act of rising, they get behind, and cross each other upon the back, below the shoulders, which may occasion their being luxated, or even fractured, and greatly increase the difficulties of the manœuvre, provided it be not remedied in good time.

In the first case, we commence by disengaging the arm that is not deviated; we then push the trunk up a little, so as to compel the head to rise, and as far as possible to diminish the pressure

upon the other arm; after which the fingers and the thumb ought to be applied as has been already directed, and act upon the same principles, but with rather more gentleness. If the arm resists, we attempt to make it rise up above the occiput, and the blunt-hook proposed by M. Dubois ought not to be employed until all other attempts shall have proved to be insufficient.

In the second, even although the forearm should have passed quite across to the opposite side, as seems to have happened in a case under the care of M. Dugès, and even though it should have risen as high as the nucha, it ought always to be hooked with the middle and fore finger to draw it down along the child's back, and bring it out of the vulva; it is generally pretty easy to succeed in this manœuvre, but the breast has sometimes to be pushed strongly up, or the trunk more or less considerably rotated, before it can be effected.

1004. Should the exertions of the accoucheur have been well seconded by the contractions of the womb, the head ought now to have descended into the excavation, or at least be considerably engaged within the superior strait, so that the occipito-bregmatic and bi-parietal diameters would be found to be in proper relation to the oblique diameters of the pelvic circle.

In that case, the right hand, passing along the front of the breast and throat, penetrates in a flattened and half-supine position quite into the vagina; the thumb and two last fingers are placed on the sides of the throat, the index and medius should be directed on to the chin, or in the mouth, or what is still better, on each side of the nose, for the purpose of keeping its head in the natural state of flexion, and approximate the facial extremity of the occipito-mental diameter as much as possible to the sternum; after having placed the right hand properly, the fœtus is to be laid on its belly upon the anterior surface of the corresponding arm, which is then much depressed towards the perineum, without, however, pulling, for the object at that moment is merely to disengage the vertex from the pubic arch. In the next place, two or three of the first fingers of the left hand are to be carried under the occiput, to sustain it, and prevent it from engaging before the chin; the thumb, the other fingers, and the rest of this hand are applied naturally behind the neck, and we attempt to push the head upwards in the axis of the superior strait, so as to cause it more easily to perform its pivot-motion.

When we have succeeded in getting the face into the hollow of the sacrum and the occiput behind the symphysis, we should wait for a pain; the woman should be told to bear down, and the two hands being fixed as has been stated, we immediately begin to exert some tractive force on the head, which is gradually drawn down in the axis of the straits, while at the same time the trunk

of the child is gradually raised upwards, as if we were going to turn it over on to the hypogastrium of the mother.

1005. When the efforts of the accoucheur have not been sufficiently seconded by the contractions of the womb, or when, after the delivery of the shoulders, the head has not performed its flexion movement, and is found to be arrested at the superior strait, it is sometimes very difficult to reach it, and still more so to get it down; however, until we can reach it, all tractive force on the trunk is to be suspended, for it would only tend to reverse it still more. The hands, placed as before, should be carried further up. At this juncture it is particularly useful to apply the fore and middle fingers to each side of the nose; for by applying them to the inside of the mouth, there would be a risk of depressing the lower jaw only, or of luxating it or straining it to an injurious degree; but in this case also it is most difficult to reach this part of the face; and further, it must be confessed, that when we have reached it, if a good deal of force is required, the fingers slip and get off from it with surprising facility; so that we are mostly under the necessity of fixing them on the most movable part of the face, a part the least calculated to bear the force necessary to make the head turn forwards.

1006. It is therefore indispensably necessary to stimulate the action of the womb or that of the abdominal muscles; as the efforts of the woman oblige the anterior or mental branch of the sort of lever represented by the head to descend first, the least pulling at the jaw in a direction from above downwards is then very efficacious; those tractions, on the contrary, which the accoucheur exerts on the trunk of the body, being more particularly transferred to the occiput, tend naturally to produce the inverse effect of the one we wish to obtain. It is therefore essential not to pull, except upon the face, whether there be any pains or not, until we have brought the occipito-bregmatic diameter of the head to correspond with one of the diameters of the pelvis.

1007. To the inconvenience of a reversion of the head there is sometimes added another that never fails to be embarrassing; instead of looking backwards and to the left, or directly left, the face is sometimes found to turn more or less in front, or directly backwards, so that the neck is twisted round on its own axis. In this state of things all tractions on the trunk of the body would be dangerous. Previously to doing any thing of that sort, we ought, in the absence of a pain, to push up the breast, and take hold of the chin with two fingers of the right hand, disengage it and direct it towards the sacro-iliac symphysis, while with the left hand on the hypogastrium we favour, first the rotation, and then the flexion of the entire head; afterwards we proceed as in the former case.

B. Right Occipito-iliac Position.

1008. In the third and sixth positions of Baudelocque, we might, strictly speaking, use the left hand with the same facility as the right; but the latter is preferred because it terminates the delivery in the first position of the feet, which appears to be rather more advantageous than the second, and because we can generally manœuvre with it better than with the other hand.

1009. Whether, therefore, the occiput be towards the pubis, the sacrum, the right acetabulum, or the right sacro-iliac symphysis, the right hand ought always to be made use of, in a supine position in the first case, prone in the second, half supine in the third, and in a state of semi-pronation in the fourth. By placing the thumb on the left temple, and the fingers on the opposite temple and side of the face, we can embrace the head in the hand, raise it up in the axis of the superior strait, push it towards the right iliac fossa, and then reach the ear of the same side, so that the hand may be supine, and the thumb brought close to the radial side of the index finger; the hand, being then flattened out, may slip all along the child's right side, and as it becomes prone, get hold of the feet, and act in all respects as the left hand does in a left occipito-iliac position.

1010. When the *face presents first*, the manœuvre does not sensibly differ from that which is used for the positions of the vertex. The right hand is always to be introduced where the chin is to the left, in front, or to the rear; or to speak more generally, and perhaps also more correctly, the right hand is to be employed in all cases where it seems easier to push the forehead towards the right iliac fossa than towards the opposite one—and the left hand in all other cases.

1011. The other inclined positions, that is to say, those of the temples and posterior part of the occiput, when they cannot be early reduced to the corresponding ones of the vertex, are classed among the positions of the trunk of the body, whence it manifestly follows, that in turning by the feet there can be only two positions of the head; therefore, as these two positions themselves, as to their practical indications, differ only in one requiring the right hand more particularly, and the other the left hand, and as it is only necessary to transpose to the right hand the rules already laid down for the government of the left—it is clear, in point of fact, that all the manœuvres of the head are naturally reduced to a single one, and that by multiplying them, we naturally fall into fastidious repetitions, evidently of no use, and fit for nothing but to overload the memory of the student.

§ II. OF TURNING BY THE FEET IN PRESENTATIONS OF THE TRUNK.

1012. Although it may not be certain that no case has been seen, in a well-formed pelvis, where the trunk of the fœtus was so situated that the head was turned directly backwards; although it is difficult to conceive of such a phenomenon, an error was committed by those who maintain that the same holds good of the anterior part of the pelvic circle. The ossa pubis being lower than the sacro-vertebral angle, and the soft parietes of the abdomen being very distensible, the posterior concavity of the symphysis does not, like the projection of the spine, repel the head towards the sides of the median line, and admit of its fixing itself directly in front.

1013. Besides, this last-mentioned position has been many times met with. To the proofs already in possession of the profession on this subject, I might add several more; but I shall content myself with citing only one. A woman, in her fourth pregnancy, and whose former labours had exhibited nothing peculiar, continued several days in labour at my amphitheatre; she was carefully attended to by the students, and all of them had an opportunity of satisfying themselves that the right shoulder was at the orifice, while through the remarkably thin parietes of the abdomen the head could be felt almost naked, above and in front of the symphysis pubis. However, as these positions are rare, and do not at all alter the fundamental rules of the manœuvre, I shall refer all the presentations of the trunk, as I have done those of the head, to two principal ones: namely, a left-lateral one, comprising the first and fourth of MM. Maygrier, Capuron, Dugès, and Madame Lachapelle; and a right lateral one, to which the second and third of the same authors must be reduced.

In fact, what does it import to the hand with which we operate, whether, in presentations of the side, for example, the head is a little nearer or a little further off from the anterior or posterior median line of the pelvis? If we wish to take hold of the posterior surface of the child's legs, we shall still be obliged to deliver in the first position of the feet if we use the right; and in the second if we use the left hand. As we always have to bring the child as near as possible to a transverse position, in turning, there will be rather more difficulty in those cases where it is farthest removed from that position, and rather less where it is nearest to it; but there is no other difference, and surely that is not enough to justify the importance attributed by modern writers to the question, whether the cephalo-anterior positions of the trunk ought or ought not to be admitted.

1014. I have already pointed out the reasons that induce me to admit the possibility of presentations both of the anterior and posterior surface of the fœtus; although they in reality require the same

manœuvre as those of the lateral regions, I shall say a few words about them notwithstanding, and successively pass in review the positions of the side, the posterior and anterior surfaces, taking care meanwhile to dwell only upon those to which a major part of the others ought to be reduced in operating.

A. Positions of the Shoulder and Side.

1015. By following a numerical order in indicating positions, so much confusion has been introduced, that it is almost impossible for students to understand each other if they happen not to have studied the same books. Thus, to speak only of positions of the trunk, in Baudelocque's first the head is in front, and to the left according to Maygrier, and directly to the left according to M. Gardien: now, as this mode of proceeding is entirely arbitrary, and as nothing can prevent one accoucheur, if he chooses, from calling that a first position which another chooses to denominate the third, I have thought I might arrange all the shoulder presentations under the titles of *dorso-pubic*, *dorso-sacral*, and right or left *dorso-iliac*. This is the way to avoid all ambiguity, and reduce to their just value the numerous classifications which have successively appeared in France since the time of Solayrès.

1. Positions of the Left Shoulder.

1016. *Dorso-sacral position* (3d of Baudelocque). In this position, the head, which is on the left side, may be stopped above the *foramen ovale*, the sacro-iliac symphysis, or even the iliac fossa; being referable to the corresponding varieties of the vertex positions, its different shades require to be operated on like the left occipito-iliac position. Only, instead of the head, it is the shoulder that is to be pushed up, and instead of placing the thumb and fingers on the temples, they are to be applied to the back, and to the fore part of the thorax; in fact, turning, in this case, differs from that in vertex positions, only in respect that the head is already raised or reversed, and that the first stage of the operation is effected by natural means.

1017. The left hand is to be introduced; the thumb is to be pressed on the anterior face of the shoulder or the sternum; the other fingers slip behind the scapula or chest, and the little finger remains turned towards the child's occiput.

To conform to this rule, the hand ought to be introduced half supine, or in a more or less complete state of supination or pronation, accordingly as the vertex happens to be near the symphysis pubis, the sacro-vertebral angle, or the iliac fossa; after having raised up the shoulder, taking care at the same time to push it backwards, so that the anterior surface of the fœtus may look some-

what downwards, we should endeavour to push the head towards the middle of the iliac fossa, provided it were at too great a distance from it before, which often requires a skilful combination of the efforts of the hand that presses upon the hypogastrium with those of the one which is operating in the womb. The thumb then abandons the sternum, is placed alongside of the index, and for the remainder of the procedure we act as was directed in speaking of the left occipito-iliac position.

1018. When the head is found completely in front (left dorso-iliac position), or even somewhat near the right acetabulum, we may proceed as above; only that in order to get hold of the right shoulder, the hand is in a forced state of supination, and that after having lifted it up, the head is to be carried from right to left, as far as possible, towards the iliac fossa, by acting chiefly with the thumb exactly applied to the sternum.

In cases where it is situated very near the posterior median line (right dorso-iliac position), it is very difficult to bring it back to the left extremity of the great diameter of the pelvis, because the thorax only moves, whereas the head retains its primitive position. To overcome this difficulty, we are to support the upper part of the chest with the thumb and fore finger, while the others are extended as far as the occiput, and thus serve to push from behind forwards, and from right to left, as if we wished to tilt it over from the occiput towards the chin.

1019. *Dorso-pubal position* (4th of Baudelocque). The manœuvre is generally much more difficult in this than in the preceding position, for it can scarcely be terminated without first being converted into a left cephalo-iliac position, or into a position of the right side. But, in either of these cases, the change we are obliged to make in the situation of the fœtus is so great, that if it be somewhat compressed by the uterus, its life is often found to be exposed to the greatest dangers. This is certainly a case where it would be proper to bring the head to the orifice, and afterwards apply the forceps, instead of turning and delivering by the feet.

1020. However this may be, provided the waters have not been long discharged, if the membranes are not ruptured, and lastly, if the child is to a certain extent movable in the womb, the best practice is to reduce it to a dorso-sacral or left dorso-iliac position: this may be effected in two different ways.

Unless the head happens to be nearer to the sacro-iliac symphysis than to the right acetabulum, we might, by turning the hand into a very forced state of supination, get hold of the shoulder, as in the cases heretofore treated of, that is, so that the thumb may tend to reach the sternum whilst the fingers remain behind the thorax, the little finger being towards the head; then we act by raising it upwards a little, the vertex in front; the hand afterwards assumes, during the operation, an attitude of pronation, which is

more and more complete in proportion as the occiput moves more towards the left iliac fossa.

1021. Should it be too difficult thus to move the cephalic extremity of the child, from right to left, over the major part of the anterior semicircle of the pelvis, we might, after raising the shoulder and head above the pubis, go immediately in search of the feet or knees, proceeding along the left side. Having got hold of the legs, the act of turning would compel the head, which, besides, is already repelled by the forearm within the uterus, to rise upwards and take a situation in the fundus of the womb. But in this case special care should be taken not to permit the child's back to turn to the posterior surface of the womb.

Should the shoulder be so disposed of that the head were to be found above the right sacro-iliac symphysis, that is to say, in the third position of Maygrier, or still nearer to the sacro-vertebral angle, the left hand, introduced in a forced state of pronation, might attempt to raise the shoulder, and move the head from the right sacro-iliac symphysis to a situation above the left sacro-iliac symphysis; but although this manœuvre may sometimes be found rather easier than the former one, it should be stated that it is perhaps a more dangerous one; for provided the two or three last fingers should not act with force upon the occiput while the thumb and index are pushing against the upper part of the chest, there is a risk of doing nothing more than effecting a retroversion of the head on to the back while endeavouring to displace it.

Should the membranes have been long ruptured, the womb strongly contracted, and the child not to be moved but with very great difficulty, there is a third manœuvre that ought then to be preferred, and which perhaps it would be well to employ in other cases; it consists in pushing the shoulder up with the right hand, from behind forwards, as if to make the spine turn upon its own axis; then trying to reach the right side by passing along the front of the chest, while the womb is forcibly pushed backwards with the left hand; lastly, in taking hold of the feet; the right one first, so as to bring them down in the first position.

1022. *In conclusion*, all the positions of the left side may be manœuvred with the left hand. By not losing sight of the rule that the thumb should always correspond to the sternal surface, the fingers to the dorsal surface, and the cubital edge of the hand to the child's head; by remembering that previously to going in search of the feet, the head ought to be moved as near as possible to the left iliac fossa, the practitioner will be aware of every thing that it is essential to know concerning the manœuvre for the left lateral surface. Should he make use of his right hand, as his first object would be to raise up the left shoulder, so as more readily to reach the right shoulder and side, the case would evidently be converted

into a right shoulder position, properly so called, which I am now about to treat of.

2. Positions of the Right Shoulder.

1023. What I have now said of the left shoulder positions being strictly applicable to those of the right shoulder, it would be superfluous to enter upon new details concerning the latter. I shall merely remark, that in the present case, the right hand performs the part which was entrusted to the left in the former case; that the head is to be moved towards the right iliac fossa previously to searching further for the feet; lastly, that the fœtus should be delivered in the first and not in the second position of the feet. After all, to save the necessity of particular description, in shoulder positions it is enough to remember that the right hand always goes to the right side, and the left hand to the left side, and that in all cases, the fingers ought to be situated in regard to the fœtus as has been already mentioned.

I will, however, observe, that these rules cannot be absolute; that a knowledge of them merely renders the operation rather easier than they may be modified in a great variety of ways; that they are principally established for young physicians who are as yet insufficiently enlightened by experience, and who require a certain number of clues to lead them through the labyrinth of practice; lastly, I will state that in cases where the hand is carried into the womb previously to the rupture of the membranes whether the child presents with its right side or its left side, and in any position of the shoulder whatever, we may arrive at the feet directly, and almost with equal facility with either hand.

B. Presentations of the Sternum.

1024. The cephalo-pubic position (1st of Baudelocque) of the sternum might, rigorously, be as well reduced to the left cephalo-iliac, as to the right cephalo-iliac position; but it is generally reduced to the latter, because it terminates it in the first position of the feet.

1025. In the *right cephalo-iliac* position (4th of Baudelocque) the right hand must be made use of; it is to be introduced supine if the head is in front, proue if in the contrary situation, and betwixt these two attitudes provided the head be fairly to the right. the part that is engaged must always be pushed back until the trunk of the fœtus, instead of being convex on its anterior face, shall become concave; then the operator should endeavour to reach the right shoulder behind which the fingers are to be applied, while the thumb rests on the anterior surface of the thorax; afterwards, nothing more remains to be done except to swing the bis-

acromial diameter, so that its posterior extremity may turn downwards, by acting upon it as upon a lever of the first kind, whose fulcrum is represented by the thumb, and the power by the fingers; this being done, the position differs in no respect from the corresponding one on the right side, and is to be managed in the same way.

1026. In the *left cephalo-iliac position* (3d of Baudelocque) the left hand does what the right should do in the opposite position; it pushes up the breast, gets hold of the left shoulder, draws it down a little, and if the head were too far from the iliac fossa, it brings it nearer to it, obtains a dorso-sacral position of the left shoulder, and the rest of the manœuvre presents nothing of a special character.

C. Presentation of the Back.

1027. *Right cephalo-iliac position.* If the head is to the right, in front, or to the rear, in positions of the back, the right hand is to be made use of as in positions of the sternum, and according to the same rules. Consequently, it is introduced half prone, supine, or more or less completely prone, accordingly as the head looks to the right, in front or to the rear; but in such a manner that the thumb may always pass in front of the right shoulder and breast, while the fingers rest upon the dorsal surface. In the first place, this shoulder is to be brought down so as to make the other rise; it is then to be repelled, by acting on it as upon the end of a powerful lever, which the thumb tends to move and to oblige the fœtus to turn on its great axis, until the position of the back is converted into a corresponding or dorso-sacral position of the right shoulder.

This movement requires great care, for if the head does not go with the trunk, the cervical portion of the spinal marrow runs the greatest risk of being lacerated, or violently twisted in the second stage of the operation; this danger is to be avoided as far as possible, by pushing the chest very far backwards and upwards, so as to give great depth to the curve of the anterior surface of the fœtus; or if it should be absolutely necessary, by getting hold of the head itself to force the face to turn forwards and downwards.

1028. *Left cephalo-iliac position.* The left extremity of the bis-acromial diameter is taken hold of, the fingers on the back, and the thumb in front of the left shoulder, or sternum, and the cubital edge turned towards the occiput; while the trunk is turning on its occipito-coccygeal axis, we should endeavour to compress the head in the movement, and, if necessary, bring it near to the iliac fossa. In one word, the left hand here acts as the right hand does in the opposite positions; it converts positions of the

back into positions of the left side, which it afterwards terminates by delivery in the second position of the feet.

SECTION 3.

Of the Manœuvre in Presentation of the Pelvis.

The manœuvre in positions of the pelvis reduces itself in some sort to that of the last stage or stage of extraction, in the head or trunk positions; I need therefore only add a few words to what has been said farther back, in order to conclude all that concerns it.

1029. Although, strictly speaking, the right hand might be easily made use of in all the positions which it is proper to terminate by the first of the feet positions, and the left only in the opposite case, it is, notwithstanding, better to do the very reverse. We can, with the right hand, in all the right dorso-pelvic positions, push up one buttock, or even both of them towards the right iliac fossa, reduce inclined to central positions, and take hold of the limbs by their anterior surfaces, without being obliged to assume an awkward attitude; whereas with the left hand the breast could not be raised without difficulty, and it would be still less easy to reach the feet, if they were not at some distance from the orifice. Lastly, by using the hand that corresponds to that side of the mother's pelvis towards which the child's heels are to be turned, while coming down, a half prone position brings the palmar face of the fingers in front and on one side; the operator is consequently in the most favourable condition to prevent the back of the fœtus from moving towards the sacro-iliac symphysis, and on the contrary, to compel it to turn towards the acetabula; the operator can also pull with all the force that circumstances may require, an advantage not to be obtained by adopting an inverse order in the application of the hand.

Whenever, therefore, it is intended to deliver in the first position of the feet, that is, whenever the child's back shall look more or less towards the left of the pelvis, or even directly towards the pubis or sacrum, the left hand should be introduced; and the right hand in all other cases.

A. Positions of the Feet.

1030. Inasmuch as the positions of the feet previously to the rupture of the membranes, are scarcely distinguished from those of the breech, there can hardly be any question concerning them until after this rupture. The accoucheur then may be called under two different circumstances, which it is important that he should not confound with each other: either the feet have not

cleared the vulva, or the trunk has more or less completely emerged.

In the former case, if the two feet present together at the orifice, or in the vagina, all he has to do is to take hold of them and draw them down so as immediately to extend the legs, and that the hips may soon arrive at the inferior strait; provided only one of them can at first be found, some attempts should be made to discover the other, which it is rarely difficult to do; should the attempt not succeed, the first one should be brought down, then secured by a fillet, and made use of as a guide to the second, which may perhaps be found reversed towards the breech, moved off far in a state of abduction, or with the leg and thigh doubled up on the belly, &c.

In the latter case the presence of the feet offers no particular indication; nothing is to be done, as was mentioned in speaking of turning in head positions, but to pull the different parts that are still unexpelled downwards.

A very necessary precaution, when extracting a child by the feet, is, to act in such a way that at the moment when the child is passing the straits, the occiput may look towards some part of the anterior semicircumference of the pelvis. The thing is easy; and no skilful practitioner will ever fail in bringing it about, when he goes in search of the feet in a head or trunk presentation. But it is no longer the case where the pelvis presents spontaneously at the superior strait; mistimed or unskilful tractions may have been instituted in his absence, or when he reaches the bed-side of the patient the hips may have been already expelled and the face turned in front.

1031. The position of the feet where the child's dorsal surface looks backwards may give rise to three particular cases: 1. The feet are still at the superior strait, or in the vagina; 2. The delivery, if left to the natural powers, may be complicated with no accident, or give no evidence of requiring the assistance of the hand, until the lower extremities, or even the hips, are born; 3. Turning has been attempted on account of some position of the head or trunk, the feet have been brought down, but the operator has failed to make the occiput turn in front.

1032. Let us here suppose the first hypothesis: after having got hold of the limbs in the manner heretofore mentioned, the back ought to be directed first towards the sacro-iliac symphysis or iliac fossa, then towards the acetabulum; with each pull, as the hips approach the perineal strait, they are taken in both hands, and in the interval betwixt two pains the whole trunk is pushed upwards again, as if we wished to make it mount up above the superior strait; as soon as the womb, which is thus momentarily distended, appears to be about to contract, the pelvis should be suddenly pulled down, while at the same time we endeavour

to make the body of the child revolve on its axis; in this way, says Baudelocque, the cavity of the womb is first enlarged, and as we endeavour in the next place to empty it suddenly, the organ is in some measure surprised, and can not contract so fast as to prevent the head from following the turn we give to the body. These attempts are to be renewed from one to ten and even fifteen times, according to the necessity of the case, that is, until the anterior position has taken place of the posterior one, or until the impossibility of effecting the change is ascertained; when the attempt proves unsuccessful, no particular difficulties remain, and the rest of the manœuvre is the same as in feet presentations in general.

When all hope of succeeding is abandoned, we must even be resigned to let the face come along uppermost; we must redouble our precautions against letting the chin depart from the breast; the arms should be disengaged, the hindermost one first, by pulling them from behind forwards, and in a direction from the head towards the thorax; immediately after this, two or three fingers of each hand should be applied to the two extremes of the occipito-mental diameter; we should endeavour to push the head upwards, or raise it so as to give it more freedom, and finally, make it execute a pivot movement, by which the face is gradually carried backwards.

Supposing it should be found impossible to turn the occiput in front, the shoulders and chest should be pulled downwards, and rather backwards than forwards, so as to deliver the chin, the forehead, and anterior fontanel before the occiput. If these tractions should prove incompetent, the forceps should be had recourse to.

1033. In the second case, provided the head has not yet arrived at the straits, we should act as in the first case, that is, the fœtus should be pushed upwards every time we wish to give the body a turn; but we must expect to succeed still more rarely.

1034. In the third, these attempts are of no use; we may neglect them altogether, and immediately disengage the arms if it be not already done; we then conform, as to the head, to the principles established higher up; some of the fingers must be applied to the chin, which we endeavour to turn from right to left, while with the other hand we act on one of the shoulders or the occiput, so as to favour the complete rotation of the head and trunk, and then proceed to deliver.

B. Position of the Breech.

1035. As the knees occasion no difficulty, by their presentation merely, in delivering a lying-in woman; as their presence does not at all alter the principles, nor even the practical details of the

manœuvre ; as one or more fingers are all that is required to disengage them, or give them a regular position when in the vagina ; and lastly, inasmuch as, where this presentation does not return into the class of breech presentations, it is always an easy matter to reduce it among the presentations of the feet, I shall not devote a special article to the consideration of it, but shall pass at once to the consideration of breech presentations.

1036. The left hand should be preferred in breech presentations, as in those of the feet, whenever the back is turned more or less to the left, and *vice versa* for the right hand. The child being doubled up, with the thighs and legs raised up along the abdomen, if the hips have cleared the orifice of the womb and descended into the excavation, or even to the inferior strait, the groin that is most backwards should be hooked with a finger or two, while the thumb of the same hand is applied to the outer surface of the anterior hip. If any resistance is experienced, there will be some advantage in substituting one or two fingers of the other hand for the thumb, and if that will not answer, the blunt hook should be made use of. As soon as the hips have cleared the vulva, it is generally very easy to extend the limbs, and the rest of the process is merely a footling delivery.

1037. Previously to the rupture of the membranes, and where the breech is not yet so far engaged as to render it impossible to push it up again above the superior strait, whether the fœtus be doubled up or merely in a squatting attitude, we should always endeavour to bring down the feet.

1038. In order to push the breech up, the hand is placed under it and along the posterior surface of the thighs ; the thumb is placed on the anterior and the fingers on the posterior hip ; or, where the fœtus is still very movable, and very high up, it is enough to apply the thumb under one of the ischia, and the fingers under the other ; the pelvis is then pushed towards the iliac fossa that corresponds to the hand that is made use of ; then by passing along on the outer surface of the limb that is nearest the sacrum, the feet may be got hold of and brought down, so as to allow us to embrace the forepart of the legs with the hand, and deliver, as in a corresponding position of the feet ; that is, in the first if the left hand is used, and in the second position if it is the right hand.

1039. *In conclusion*, the manœuvre of the pelvis presents us but two particular indications : 1. To draw it down with the fingers or blunt hooks, when it is too low down to be pushed back again ; 2. To displace it whenever the thing is possible, so as to let the feet pass down first. In both cases, when we employ only one hand, the palm of which is directed so as to slide up along the child's abdomen and breast, we surely require for our guidance only the following rule ; that the fingers shall always be ap-

plied to the ischium or hip that is *opposite*, and the thumb to the ischium or hip that *corresponds* to the hand that is operating. Were the limbs found to be reversed upon the dorsal surface, instead of being turned towards the abdomen, the thighs should be acted on as we do on the arms, when disengaging them at the inferior strait; the thumb fixed in the groin might serve as a *point d'appui*; the fingers being moved along towards the ham, would represent the power, and the knee would be obliged to descend, drawing the leg along with it. The two limbs ought thus to be brought either together or in succession, to their natural position. In whatsoever way they may present, it is always better to make them descend together, than one by one; however, where too much difficulty is experienced, it would be imprudent to persist in endeavouring to make them descend simultaneously. If one of them should have already escaped, the anterior one, for instance, and it should be impossible to get the other one down, the delivery, in most cases, would not be rendered on that account much more difficult: it should be made use of to draw down by, while the index and medius fingers, or a blunt hook, should be applied to the posterior groin, as has already been mentioned. If, on the other hand, the anterior member only should be retained at the superior strait, it is still more important than in the former case to draw it near the other limb, because we cannot so readily reach the groin in this situation, and especially because the action of the blunt hook is not so advantageous.

1040. *Remarks.* In concluding this article, I shall take the liberty of again suggesting to students and young accoucheurs, that if, in turning by the feet, they wish to avoid the risk of often killing the fœtus, they ought never to lose sight of the fact that the head cannot rotate on the spine more than a quarter of a circle, without luxating it, or straining the spinal marrow in a very dangerous way; that, in general, it does not follow the motion of the trunk of the body, by means of which attempts are made to rotate it: that it is impossible, in any case, to affirm that it has rotated, merely on the ground that the back, for example, has been turned from behind forwards; consequently, that in any species of manœuvre whatever, we should commit a very great error if we caused the child's body to turn more than a quarter of a circle, without being assured that the head accompanies it in its movement.

1041. Neither can I leave this subject without returning for a moment to the consideration of the manœuvre recommended by Baudelocque for bringing the child's back in front, and which was spoken of some pages back. It would, in my opinion, be wrong to rely upon such attempts. If the womb is but slightly contracted, it is useless to act in that way; when, on the contrary, the fœtus is forcibly compressed, the force which we exert upon it

from below upwards, seldom extends as far as the head, and even then it certainly does not change the general disposition of the womb, so as to render the child at all more movable. This is not all; if it be not certain that we shall be enabled, in this way, to render the rotation of the occiput easier, it seems to me manifest that the abdomen, the thorax, and even the cervical portion of the spine would not always safely bear the various kinds of pressure and the twists to which they will necessarily be subjected; lastly, to express my unreserved opinion, I will say that this precept of Baudelocque seems to me to be more the fruit of imagination than of observation, and that modern writers ought, previously to copying it, at least to have called it in question and submitted it to a new examination.

SECTION 4.

Presentation of the Arm.

1042. The premature escape of the arm does not, of itself, constitute a position, and forms only a complication of other positions, particularly that of the shoulder. Both arms have been seen, but rarely, to present together at the vulva; unless brought there by inconsiderate manœuvres, they could not both thus descend except in back or sternum positions. It is said that they have been both felt at the orifice at the same time with the feet, and it is at least certain that they may precede the head at the inferior strait; so that, although the presence of the hand commonly indicates a position of the shoulder, it may also happen that it is only a complication of a head or pelvis position.

1043. Until, in the last century, nothing was deemed more dreadful than the appearance of the arm in the course of a labour; and in our day, the common people still look upon such an occurrence as extremely dangerous. But these fears are explained by the fact, that until the time of Levret it was not thought possible to penetrate into the womb without having previously returned the prolapsed member into its cavity. In reflecting upon the dangers occasioned by the ridiculous or barbarous measures adopted in cases of this kind, could it be believed that physicians would have seriously recommended that a piece of ice should be put into the child's hand, that it should be pinched or filliped, to make it pull its arm back! Others have invented a sort of forks, or crutches, &c., to push it up with, by acting upon the chest; the more timid pushed it up to the top of the vagina, and sometimes succeeded in returning it into the cavity of the womb; but their attempts were generally in vain, and the arm, if somewhat swelled, seemed to them to constitute an insurmountable ob-

stacle to the introduction of the hand into the os uteri. Under such circumstances, the old women, and even the physician himself, could imagine no alternative save pulling at the arm until the child yielded, and came away doubled, or until the arm was torn off. Paré advises that the soft parts below the shoulder should be first cut round, and that we should then resort to sharp pincers to cut the bone with ; De la Motte recommends us to twist the limb round like the limb of a tree that we might wish to tear off from the trunk ; lastly, the most timid were satisfied with making deep scarifications in the tumefied part, so as to lessen its size.

Happily, at the age in which we live, such a dreadful doctrine is held by nobody. Baudelocque and his successors did it justice long ago ; and at present it is not without a sentiment of indignation, that we still hear from time to time of practitioners who dare to conform to it in practice. I should not even insist upon this point, had not certain persons had the inconceivable audacity to renew this revolting practice of late years in Bretagne, Normandy, Champagne, and even in the environs of Montpellier, almost at the same time ; particularly, had not these practitioners found some defenders in the capital ; had not certain persons had the hardihood to publish, in 1826, 1827, and 1828, various pamphlets to justify a conduct so far removed from tokological doctrines, and had they not anew appealed to the authority of A. Paré, Mauriceau, Deventer, De la Motte, Puzos, Mesnard, Levret, &c., as if the modern accoucheurs had not overturned, without exception, all the reasons advanced by their predecessors in favour of the amputation, or tearing off of the arms !

1044. I do not intend to deny that it never has been necessary to separate from the trunk a member prematurely escaped, in order to penetrate more readily into the womb ; I merely assert that I cannot conceive of such a necessity ; that it is impossible to admit of it except where the child is dead ; that no matter how much the arm may be infiltrated or swollen, a skilful accoucheur will always be able to carry his hand into the womb without mutilating any thing ; lastly, that without being able to say how far the Norman surgeon may have departed from sound rules, we must at least admit, that the reasons and proofs cited by M. Roux for his excuse, would be dangerous if taken in the very letter.

1045. In order that delivery may be effected, the child's head must pass through the os uteri : but the hand of the physician and the arm of the child can never be equal in size to the volume of the child's head. Therefore, the presence of an arm is incapable of preventing the hand from passing into the uterus, even although there should be infiltration and tumefaction of the labia ; and after that, it becomes completely useless to return the arm previously to going in search of the feet.

Therefore, when a hand appears at the vulva, and it is impos-

sible to ascertain certainly that the corresponding shoulder is at the superior strait, far from becoming alarmed, and pushing it back, it is, on the contrary, best to secure it with a fillet; the fillet being fixed, the shoulder is next pushed up, and we proceed to get hold of the feet, just as if there were no complication whatever. As we draw the lower extremities downwards the arm mounts upwards, and the fillet serves to pull it along at the same time with the feet after the version is complete.

1046. Although the descent of the arm along with the head is not a serious cause of dystocia, there are, notwithstanding, cases where the course of the labour is really embarrassed by such an occurrence. Consequently, we may get rid of the complication if possible. If called before the superior strait has been passed, there is no difficulty in returning the child's hand into the uterus, and retaining it there by means of a few fingers until the head is well engaged. If called at a later period, great difficulties are sometimes experienced; in some instances the thing is impossible; we must, under such circumstances, endeavour to make the hand slip along the forehead towards the sacro-iliac symphysis or obturator foramen of the side where there is the least pressure; but should some new difficulty arise, rendering the immediate termination of the labour necessary, the forceps would be applied, without regard to the presence of the arm.

In case the hands should present at the same time with the feet, they doubtless would not long maintain their position; the contractions of the womb would soon force them to rise, by urging the breech down. Besides, in order to obviate all cause of alarm, it would be merely necessary not to confound them with the lower extremities, and to pull upon the latter until the hips had come down.

Pean and Deleurye have advised, where an arm and shoulder fill up the orifice too exactly to allow the hand to reach the child's foot, that we should begin by bringing down the other arm, so as to enable us to penetrate more easily into the womb. This precept has been the object of much criticism: it has been said that two arms must necessarily occupy more space than a single one; that by bringing a second one alongside of the first, instead of overcoming the obstacles, we should only increase them; and that if the hand may be carried up as far as to the arm that has not yet escaped, there is no reason why it could not reach to the feet themselves.

I have had no occasion to repeat the practice of Deleurye in this respect; nevertheless, it seems to me to have been proscribed previously to being sufficiently examined. Baudelocque is, assuredly, deceived, when he maintains that it is always as easy to reach the feet as the arm that is still retained above the orifice of the womb; the arm may be near enough to be seized with two

or three fingers, whilst the feet always require the whole hand to be introduced, and most commonly to a great depth. By pulling upon the second arm we tend to make the engaged shoulder mount upwards, and to convert a position of the lateral surface into one of the sternal surface, or dorsal surface, and I can conceive that in some cases there would result an increased facility of passing the hand and of performing the remainder of the manœuvre.

But what shall I say of Dr. Davis, who recommends us in certain cases of arm presentation to terminate the delivery by means of embryotomy? of Douglass, and of Sims, who profess the same sentiment; and above all, of Dr. Lee, who, to spare the mother, *separates the arm from the body, perforates the thorax, fixes a crotchet upon the pelvis or inferior part of the fetal spine, and by means of sufficient force thus extracts the child!* as if this operation were not an hundred times more dangerous, even for the woman, than the most painful and complicated version! Who shall say how far the temerity of certain persons shall carry them? Has not a surgeon in one of the colonies lately had the hardihood to perform the hypogastric Cæsarian operation simply because turning appeared to him to be too difficult in an arm presentation, and what is still more surprising, to boast of his conduct, as a model to be followed? It is only by remembering, that in the sciences, where men are always to be found who invariably substitute for the bounds of the *possible* the limits of their own knowledge and capacity, that we are enabled to conceive of such scandalous practices.

As long as the accoucheur is not in possession of certain proof of the child's death, he has no right, under any pretext, to mutilate it; and if ever the presence of the arm could really prevent the intromission of the physician's hand, it would be far better to follow the advice of Bodin, and perform the vaginal Cæsarian operation, than to have recourse to embryotomy. Even although the child be dead, we should proceed in the same manner, and, in the first place, put in requisition blood-letting, the bath, injections, ointments, indeed all sorts of relaxing and sedative measures.

General Recapitulation on the Manœuvre.

1047. In the manœuvre, *all the positions of the head may be reduced to two; all the positions of the side* belong to the second stage of the manœuvre for the head positions; and *all the positions of the back* and of the *sternum* should be reduced to shoulder positions; and *all positions of the shoulder* are at first converted into positions of the feet. In turning, therefore, there are, in fact, but two positions which it is essential to study profoundly, and consequently but two manœuvres which it is indispensable to

know well : further, as these two manœuvres differ only in requiring the employment of a different hand, as in reality the right hand does not manœuvre differently from the left, it follows that the whole manœuvre in labours is reduced to the rules which were laid down in speaking of version by the feet in positions of the vertex. I am aware that, as thus proposed, the question will not be always exactly understood ; but I also doubt whether those to whom these general rules will not suffice, will be able to make much out of the most elaborate explanations. In the detailed applications there is an infinity of shades which words cannot describe, but which is easily guessed at by an intelligent man or which practice alone may teach him to discriminate.

ARTICLE II.

OF THE FORCEPS.

SECTION 1.

The Forceps in itself considered.

1048. The forceps is an instrument with which the child, while still within the organs of the mother, is seized and drawn forth. It is not very precisely known who was the first inventor of this sort of pincers, nor at what period it was first made mention of. It is true that in the time of Avicenna certain blades with teeth in them were made use of for the extraction of the dead fetus ; Rueff also speaks of a pincers he made use of to extract the separate bones of the cranium, but what comparison is there between these clumsy instruments, which no one would have ventured to apply to a living child, and the forceps employed at the present day ?

1049. The Chamberlains were for a long time in possession of a secret for terminating difficult labours. One of the members of that family came to Paris for the purpose of convincing the French of the value of his instrument ; but as he was not successful in his first attempts, and was ill satisfied with his reception in France, he returned with his secret to London. Chapman and Giffard, who pretend to have been acquainted with the means employed by Chamberlain, published a description of it at the commencement of the eighteenth century, and asserted that it consisted of a forceps for taking hold of the head with ; a surgeon of Brentford, whose name was Drinkwater, is also spoken of as the author of a similar forceps ; but it is really impossible to determine whether

the Chamberlains made use of a forceps or a lever, or some other instrument, nor whether the *hands*, which Palfyn says he first thought of, and the invention of which was claimed by Ledoux, were any thing else than the instrument used in England.

1050. However this may be, it was about this time that the use of the forceps was introduced into the practice of midwifery. At first, formed of two blades, either full or fenestrated, which were introduced separately into the pelvis, and which were but slightly curved, they soon received the addition of a double notch, to admit of their being crossed. Smellie made them an extremely simple instrument, the application of which is as easy as possible; this accoucheur even thought it would be well to have two forceps, one very short, to be applied to the head when already down in the excavation, and the other rather longer, having a concave edge, for the purpose of penetrating as far as the superior strait.

Levret, on his part, introduced such important modifications of the forceps, that he in some sort made a new instrument of it, which is still known in the science as *Levret's forceps*. Like all the others this forceps is composed of two branches: one called the *male* branch, which I prefer to call the *left* branch, and the other the *female* branch, which I shall call the *right* branch; the blade of each is largely fenestrated, has a bead or blunt crest on the circumference of its concave surface, and on one of its edges exhibits a curve which corresponds with the curve of the axis of the pelvis.

The handles, which are entirely metallic, and not quite so long as the blades, terminate by a flattened hook. At the place where they cross there is a flat surface, a pivot and a mortise, which admit of their being firmly united, and prevent them from sliding on each other when they are once applied.

1051. Since the time of Levret and Smellie the forceps have undergone numerous changes, without speaking of those of Ræderer, Crantz, Walbaum, Johnson, Fried, Stein, Leake, Plench, and an infinity of others, the figures of which may be seen in the treatise of Muller. We have the jointed forceps of Saxtorph, which in other respects very closely resembles Smellie's instrument; that of Coutouly, also jointed, but at the same time much more complex than the former, and which admits of various shaped blades being fixed to the same handle, according to circumstances; another one, by the same accoucheur, for the handle of which there is substituted a transverse metallic hilt, and, in consequence of the manner in which the branches are united, must act like a lever of the third kind; that of Baudelocque, or Pean, which differs from Levret's only in being rather longer; the forceps of Thenance, the branches of which need not be crossed, and which unite near to the curved end of the handle, and is thus converted into a lever of the third kind, like one of those of Coutouly. The two forceps

of M. Dubois; that of Brulatour, jointed by a peculiar mechanism; that of Bruninghausen, the pivot of which is replaced by a sort of round-headed nail, and with very small fenestres in the blades; then the forceps of Méryen, which is also jointed; then that of Doctor Guillon, also jointed, and which has no need of a movable pivot in order to be united, and contains in its handle a pelvicocephalometer, blunt hooks, sharp crotches, a perforator, and an extractor. Lastly, MM. Capuron, Maygrier, Flamant, Colombat, and Prout have also thought proper to propose some modifications in the construction of the forceps, so that the profession is now in the possession of near a hundred species.

1052. There is not, strictly speaking, one of these forceps with which the principal object proposed, viz., the extraction of the fœtus, cannot be attained; but at the same time, not one of them presents more real advantages united than Levret's. Its inventor, who applied it so often, Baudelocque, whose practice was so extensive, Mesdames Lachapelle and Boivin, who must have assisted the delivery of so many women, MM. Désormeaux, Gardien, Evrat, &c., never felt the necessity for modifying Levret's forceps, and M. Dubois himself has long since rejected in his own practice several alterations in them introduced by himself.

It is well to remark, besides, that most of these pretended improvements have been proposed only by young men, who had had no opportunity of convincing themselves that in this, as in all other surgical operations, much less reliance is to be placed upon the form of the instrument than upon the address or skill of the operator.

1053. The Levret forceps, made somewhat larger according to the views of Pean, deprived of the bead upon its concave surface, and file-polished, in the way directed by Professor Flamant, terminating in blunt hooks, containing a *pique*, as recommended by M. Dubois, without any shoulder near the joint, and without a sliding plate to secure the pivot, is the one I prefer. A correction that I would willingly adopt, provided it could be effected without weakening the instrument, would consist in having hinged joints, so as to permit them to be doubled up, and thus rendered more portable; but up to the present time this has been attempted in vain, and an examination of the forceps lately made by M. Colombat, leads me to think that that ingenious surgeon will not be more fortunate in this respect than his predecessors.*

* I cannot omit this opportunity for saying that I consider the obstetric forceps of Dr. Davis, of the London University, as the most convenient and safe instrument that has as yet been constructed. Its fenestra is so large, that a considerable part of the parietal region is prominent through it—its new curve is so admirable that it is scarcely practicable to injure the anterior sacral nerves or other tissues with it, and its length is also so well adapted for delivering from above the superior strait. Its lightness, not inconsistent with all needful strength, is a high merit in this excellent instrument. I satisfactorily employ it in preference to the Baudelocque forceps or that of Siebold, which are so generally approved of in our country.—M.

SECTION 2.

Of the Use of the Forceps.

1. The cases that require the employment of the forceps are numerous, and may be divided into two classes: in the one, no other means except the forceps can be had recourse to: in the other, it would, strictly speaking, be possible to have recourse to turning, or to rely upon some other means of succour, should it be desirable to avoid applying the forceps. Antecedently to the invention of this instrument, all those labours, that could not be terminated by the hand alone, were treated by embryotomy, or by some serious operation upon the mother; at present we are rarely reduced to the necessity of thus sacrificing the child, and of equally compromising the safety of the mother, because the forceps generally suffices to obviate this destructive practice.

1054. It has been laid down as a general rule that the forceps must be applied, 1. Whenever the head is too large, either relatively, or absolutely, to pass through the passages without exposing the woman to the hazard of exhaustion, or other dangers; 2. When the womb is in a state of inertia, and efforts to restore its contractility prove to be in vain, and the head is found to be so far engaged that it is impossible to restore it to the superior strait; 3. When any accident renders the extraction of the fœtus indispensable, and the head has already descended into the excavation.

1055. *Too large a head.* If, as is already proved by the experiments of Baudelocque, and some other authors, the head of a new-born child, when squeezed so as to bend a forceps of the best construction, is reduced in diameter not more than three or four lines at the utmost, it is evident that when taken hold of within the pelvis, where it is already more or less compressed in various directions, it would not be prudent to depend upon any greater degree of reduction; and besides, to obtain a reduction to that amount, it would be necessary for the instrument to be applied exactly to the two extremes of the bi-parietal diameter. But when we come to reflect upon the difficulty of fixing the blades exactly upon the points desired, and that each of them is a line and a half in thickness, it is difficult to believe that a head too large to pass through the pelvis under the influence of the powerful contractions of the womb and the well-directed efforts of the woman, could derive any great assistance from the application of the forceps.

1056. *Weakness of the organism.* Inertia, or want of contractions of the womb, is one of the cases for which the forceps is most frequently applied. When the head passes with difficulty

through the straits, and the woman is exhausted with vain efforts, the efficacy of this instrument is not contested by any one ; but this is not the case where there is inertia only, without any narrowness of the passages. Here every thing should be tried with a view of restoring the action of the womb, and the forceps ought not to be made use of until after the ergot has been tried in suitable doses.

1057. *Accidents.* When the child presents by the vertex or by the face, and one of the complications pointed out in another article renders it necessary to deliver the woman without delay, one of the two following conditions will necessarily exist : 1. The membranes have been ruptured and the waters discharged for a long time ; the womb is strongly applied to the fœtus, and the head has reached the excavation, or it is at least pretty firmly engaged in the superior strait ; in which case nothing can supply the place of the forceps ; 2. The os uteri is dilated, the head is engaging, the membranes are ruptured : strictly, the forceps might be applied : but the child is still sufficiently movable to admit of our going in search of its feet. In this case practitioners are not agreed as to the best mode of proceeding ; some think, with Levret, Smellie, Plenck, and especially with M. Flamant, that the forceps promises greater advantages than turning ; others, along with Madame Lachapelle, M. Désormeaux, and almost all the modern practitioners, are of a contrary opinion. I think there are error and reason on both sides. M. Flamant speaks the truth when he maintains that the forceps is much less dangerous for the fœtus than turning by the feet, and that it is to be preferred in all cases where too much difficulty does not arise in its application ; but he relies too much upon his personal address, and certainly inculcates a dangerous principle when he affirms that turning and delivering the child by the feet is almost never necessary ; and that, however movable and high up above the abdominal strait the head may be, the forceps is always to be preferred.

1058. Every accoucheur knows that if the head is still movable, it will displace itself during the introduction of each branch of the forceps, and most generally is difficult to get hold of ; that as the blades of the instrument cannot, in reaching it, be accompanied by the fingers, unless, as is M. Flamant's practice, the whole hand is introduced into the pelvis, they are in some measure introduced at hap-hazard into the uterine cavity ; that it is most generally impossible to say, exactly, whether they embrace the occipito-frontal diameter, rather than any other ; finally, that the woman is exposed to a thousand dangers, whereas the feet may be brought down with far less difficulty, and at a much smaller risk of accidents ; but it is also undeniable, and it appears to be too much overlooked at the present day, that although the

woman runs incomparably less risk in turning, the same is not true as to the child, which too frequently becomes the victim of this manœuvre, while it scarcely suffers at all under the methodical application of the forceps.

1059. It is therefore wisest to pursue a just medium betwixt these two extremes, to prefer the forceps, when we are much accustomed to handle them, when they can be applied without too much difficulty, and without any fear of injuring the woman; on the contrary to have recourse to the hand to draw down the feet, under the opposite circumstances, that is to say, when the head is too high up, or too movable to be easily got hold of, and where there is nothing to prevent the artificial evolution of the *fœtus*.

2. *The forceps should only be applied to the head of the fœtus*; Smellie and others were wrong to advise their being applied upon the *fœtal* pelvis; for should even a small amount of force be employed, they would crush the bones of the hips; the upper ends of the blades would contuse or lacerate the abdominal viscera, and inevitably kill the child; besides, the blunt hook or fingers would always advantageously supply their place here; the head is the only part upon which it can act or be placed without inconvenience, and for which it was constructed.

1060. From Levret and Smellie down to the most modern accoucheurs, the French and English authors have all recommended that the forceps should be applied so that its two claws should cover the two extremes of the bi-parietal diameter; that its long axis should be parallel to the occipito-mental diameter, and its concave edges turned towards the occiput, excepting always those cases where the head is delivered in an occipito-posterior position; it is true, that Deleurye and Baudelocque had admitted that where the head is locked transversely at the superior strait, it might at first be grasped by the occiput and forehead, so as to make it descend into the excavation, to be afterwards laid hold of in a more advantageous manner; but as far as I know, nobody has followed this advice, especially as the case supposed by Baudelocque has, perhaps, never occurred.

1061. The practitioners of Germany, Prussia, and Russia, follow quite a different rule; they pay no regard to the position of the head; the pelvis alone guides them; according to them, if the convex edges of the blades look toward the iliac fossæ, they are well placed; the reason they assign is that we can very rarely beforehand determine what is the exact situation of the occiput; that even supposing we could ascertain it, it would not on that account be necessary to change the mode of application of the instrument, inasmuch as, in the diagonal positions, the mere power exerted in fixing and uniting the blades brings the forehead in front of the sacrum or behind the pubis; that completely transverse positions are exceedingly rare, and would render the application

of the forceps, too difficult, if the design of embracing the parietal protuberances were obstinately persisted in; lastly, that by conforming to their doctrine the operation is always extremely simple, and that the head almost always ends by placing itself, if it were not so already, in an antero-posterior position; so that, after all, the same result is obtained, only, by conforming to the principles generally adopted among us.

1062. Without denying that there may be somewhat of truth in this view of the subject, which, it seems to me, has not been sufficiently attended to by the French, it may, nevertheless, be objected, that as a general proposition, it will always be better to pass the blades of the forceps immediately upon the temporo-parietal regions of the head, than always to introduce them along the sides of the pelvic cavity; that if it is rare to find the head situated directly across the pelvis, it is at least common to find it turned towards one of the acetabula, or sacro-iliac symphyses; that it is not only good, under such circumstances, to have the forceps turned somewhat to the right or left; but also, that it most commonly assumes that direction spontaneously; and, so to speak, in spite of the operator, provided the head be pretty firmly fixed in the passage. Let us observe, further, that by grasping the two ends of the occipito-frontal diameter, the head is prevented from flexing; it is forced to descend transversely, to present one of its longest diameters to the different passages, and that if taken hold of in this situation, it cannot pass through the inferior strait.

1063. To conclude, inasmuch as the occipito-bregmatic and occipito-frontal diameters always turn more or less directly from front to rear when they reach the excavation; as in cases where the head has not yet cleared the superior strait, the occiput or forehead almost always looks towards one of the cotyloid cavities; as the claws of the forceps, after their introduction, naturally incline towards the sides of the head, or when it opposes but little resistance to the force exerted upon it, cause it to turn on its vertical axis, it may be said that the difference between our practice and that of the Germans is greater in appearance than in reality, and that, in fact, it does not appear that it can ever be indispensably necessary to place one of the branches of the instrument in front and the other behind.

1064. Thus the forceps may be applied to the head when the vertex or the forehead comes first, and even when the trunk escapes before the head.

To render this application indispensable, it is necessary: 1. That the head shall not require to be reduced more than two or three lines, or that it shall be possible to displace it, and direct it more advantageously through the straits; 2. That there shall be a pressing need for terminating the labour without delay, or that no further reliance can be placed on the powers of the woman in the

expulsion of the child; 3. That the head shall be engaged so far that it would be impossible without difficulty to return it and proceed in search of the feet; 4. That the membranes shall have been ruptured and the os uteri completely dilated for a greater or less period of time.

1065. Previously to commencing the operation the same precautions should be taken as for turning: the woman should be situated in the same manner; however, there may be circumstances in which the accoucheur need not alter her position; for example, in case of convulsions, hemorrhage, or extreme debility, indeed any circumstances which would render any shock or movement dangerous; but then the head must have cleared the abdominal strait, in which case a short forceps may be made use of, such as Smellie's, for example.

The posture on the side adopted by the English for spontaneous delivery is also preferred by them as most favourable for the applications of the forceps, which I can hardly conceive of.

As it is wrong to introduce the forceps into a woman's organs, without advertising her of it, I think the best mode of quieting and reassuring her is to show her the mechanism of the instrument.

There should be in readiness some warm water to attemper the instrument; and some butter, oil, or mucilage, to make it slip more easily over the surfaces; when every thing is properly disposed of, and the position of the head has been ascertained, nothing remains but to introduce the blades; but as there is some difference in this manœuvre, according as the occiput is directed in this or that manner, as the head descends before or after the trunk, I shall now proceed to examine these different cases.

§ I. OCCIPITO-ANTERIOR POSITION.

1066. This position, the most advantageous, and most frequent of all, requires that the left branch should be introduced first. Two or three fingers of the right hand, in a flattened position, are to be passed up betwixt the left side of the vagina and the parietal protuberance, so that their extremities may touch the os uteri; the instrument is then taken by the left hand, as a writing pen, is held, and the handle is first raised up high in front of the woman's right groin, so as to bring the other extremity in the line of the axis of the vulva or inferior strait: as for the introduction of the hand, the interval between two pains must be chosen; it is introduced gently, without force; in proportion as it enters, the handle is by degrees brought from above downwards and from right to left, towards the median line; after this it is frequently necessary to place the thumb above and to the right of the pivot, instead of leaving it beneath it; it is thus moved onwards, making it follow the left posterior inclined plane or front of the sacro-iliac symphysis, rather than the left side of the pelvis properly so called, until

its *entablement* shall have arrived between the labia; after which the handle is brought near the internal surface of the left thigh, depressing it more or less according to the depth to which the blade has been carried.

During this introduction the point of the clam, held very strictly betwixt the head of the fœtus and the parts of the woman, ought never to deviate from the curve of the excavation. By deviating from the axis of that cavity, it would be arrested by the vagina, which it turns up in folds, or might lacerate; if inclined too much in front or to the rear, it would involve the bladder or rectum in the danger of being wounded. On the other hand, by turning too much inwards, which almost always happens in using a forceps with a very concave blade, it abuts against the child's head, and is soon stopped by the folding up of the scalp; so that in any way it would be dangerous to introduce it by force.

Whenever, therefore, any resistance is experienced that does not appear to be natural, instead of pushing it on with too much violence, the instrument should be withdrawn a little ways so as to disengage it, and afterwards slip it up in a more favourable direction.

Where the head has passed through the os uteri, as long as the forceps does not abandon the fingers that are in the vagina, one must be very awkward to go amiss; but this is not the case where the head is almost inaccessible, and where the circle of the orifice still envelops it in the shape of a crown fitting more or less tightly. The greatest attention is necessary here: if the end of the clam deviates from the cranium, it slides over the outer surface of the os uteri, and gets into the cul-de-sac, or circular groove formed by the vagina, where it is attached to the neck of the uterus. If the accoucheur should not perceive this deviation, it is easy, without pointing them out, to comprehend the havoc and danger that might ensue. However, in order to avoid them it suffices never to make the instrument penetrate beyond the parietal protuberances without being previously assured of the position and state of the os uteri.

1067. When we are sure that the left branch is well placed, an assistant takes hold of it and keeps it in contact with the thigh while the physician introduces the other.

This one is to be taken in the right hand, and guided by the fingers of the left, to the right side of the pelvis, or corresponding sacro-iliac symphysis; to make it enter, we are to act exactly as was just now directed, in speaking of the left branch. If the occiput is inclined to the left, we endeavour to move the blade forwards behind the right thyroid foramen. If it be a right occipito-acetabular position, on the contrary, we leave it in front of the sacro-iliac symphysis, while we endeavour to get the left branch behind the left acetabulum.

1068. In order to be able to unite the two branches of the forceps, they must both be at the same depth in the pelvis; the mortise in one must correspond exactly to the pivot in the other; their place of crossing must not be more to the right than to the left, and their handles must be sufficiently depressed. When the occiput is behind the symphysis pubis, it is sometimes difficult to fix them exactly upon the sides of the pelvis; they incline towards each other at their convex edges, while their concave edges tend to separate, which doubtless depends upon the head being not so thick towards the forehead as towards the occiput. This difficulty may be overcome by taking a firm hold of the blunt hooks of the forceps, so as to use them as a bent lever of the third kind, but we should be very sure that the obstacle depends upon no other cause. By following this precept, the concavity of the blades comes to be applied over the parietal protuberances when the occipito-frontal diameter is in line with the sacro-pubic, and, in the oblique positions, the vertex is displaced, and promptly directs itself to the top of the arch of the pubis.

Further, it is evident that when the head is too firmly fixed, one of the branches of the forceps will, under efforts of this kind, resist less than the other, and place itself under the corresponding anterior inclined plane of the pelvis; so that the three occipito-anterior positions, so far, do not sensibly differ from each other as regards the application of the instrument. The hand generally suffices to turn the pivot, otherwise the kind of lever called the *key of the forceps* is had recourse to.

1069. In the next place, we ascertain that the head is the only part embraced by the blades, and that the os uteri, the womb, or some other part of the woman, is not taken hold of; the mode of acquiring a degree of certainty upon this point, consists in moving the instrument gently from *handle to handle*, in the direction of the axis of the pelvis. If it moves readily, and without making the woman suppose that she is getting *torn* or *pinched*, there is nothing to fear; in the contrary case, it is almost certain that some fold of the genital organs has got pinched in the clams of the instrument, and until the head shall have been more properly embraced, all pulling and every species of pressure should be carefully avoided.

1070. In operating with a view to lessen the size of the head, a loop of ribbon, of thread, or of a fillet is fixed on one of the blunt hooks of the forceps; a turn is then made over the other branch, and the handles are brought as near together as is deemed necessary; the fillet is then carried over the first handle, then brought back over the second, and so in the form of a figure 8 until it is all used; it being well understood that the pressure exerted must be greater or less, according to the degree of reduction which it is desirable to obtain.

1071. Where the passage is capacious and the forceps is only had recourse to for the purpose of speedily delivering the woman, this compressing method may indeed be dispensed with; nevertheless, as it is always well to have both hands disposable, so as to be able to rest them from time to time, it seems to me better to apply the fillet as recommended in all cases, with this difference, that under the circumstances now supposed, it is employed solely for the purpose of keeping the branches of the forceps in a fixed and properly approximated situation.

After having wrapped the handles in a napkin, the right hand is placed near the blunt hooks, *above* as long as it is necessary to pull in the axes of the superior strait, and *below*, on the contrary, when the head is at the inferior strait; the left hand is applied at the roots of the blades, beyond the pivot, below when the right hand is above, and above when it is underneath.

1072. The forceps being properly held, and the head firmly grasped, before we begin to pull downwards the occiput must be directed diagonally, provided it be still at the superior strait; if it be in the excavation, it is brought behind the symphysis pubis. To compel it to descend to the centre of the pelvis, and to prevent the forehead from descending prematurely, it has been recommended to sustain the latter with a couple of fingers of the left hand; but I think it would be wrong to place much dependence upon this precaution, which, besides, deprives the accoucheur of a great portion of this power. I prefer trusting to the depression of the handles, to such an extent as to keep the blades in the axes of the superior strait, and to tractions performed in the same line of direction.

1073. If the head is locked, or too firmly fixed at the superior strait, we first attempt to start it as we start a cork in a bottle or a nail that we want to draw: it is then to be pushed up so as to oblige the occiput to descend in a more favourable manner. We are to pull obliquely downwards and backwards until the strait is completely cleared; as soon as the rotation movement is effected, and the head is in a direct antero-posterior position, we ought, in pulling, to move the handles of the forceps alternately right and left, until the parietal protuberances have passed the ischiatic strait. These tractions ought to be at once powerful, slow, and moderate; should there be no reason for haste, we need not pull except during the uterine contractions, which, besides, rarely fail to become very energetic and frequent, as soon as we commence the operation; but when the very moments are counted, or the womb in a state of inertia, it would be useless or dangerous to wait; we ought to act immediately.

1074. When the head reaches the vulva and is retained only by the soft parts, we leave off pulling from handle to handle. We

ought even not to pull at all, provided the womb appears to have preserved a sufficient degree of energy to enable it to terminate the labour; for at this juncture it is highly important not to proceed too rapidly, and to be assured that the best way of managing the perineum is to retain the head as long as it may be at the vulva. Instead, then, of engaging the woman to bear down, and pulling at the same time with great force, as we had previously done, she is urged to be careful of making strong efforts; it is often best even to withdraw the instrument, which, if the head be born, requires no particular precaution, while, on the contrary case, the blades are removed one after the other, holding them in the same way as when they were introduced, and beginning with the right branch, which is uppermost. Should it be afterwards necessary to exert any tractive force, it might be effected by placing the fingers upon the temples or under the arm-pits of the fœtus, as is done in some cases of spontaneous delivery.

1075. Authors have expressly advised that the noise made by the striking or rubbing of the two branches of the instrument together should be avoided, because, say they, this noise might frighten the woman. It would doubtless be imprudent to take no precaution on this head, and to clash the blades together as we would the foils at a fencing match; but I can perceive no reason for the minute precautions that are indicated in relation to the matter in the latest publication on midwifery.

§ II. OCCIPITO-POSTERIOR POSITION.

1076. The forceps ought to be introduced and fixed in the same manner as in the former position; only, it is unnecessary to depress the handles so much while drawing down: as the occiput, which, however, ought to emerge first, constantly tends to lodge against the anterior face of the sacrum and coccyx, which is very long and very concave, more numerous difficulties must be expected, as well as greater dangers to the perineum. But the operation would be still more dangerous and difficult, if, as has by some been advised, the concave edge of the instrument should be turned backwards instead of looking towards the pubis. In the first place, to conform to this precept, it would be necessary to change the posture of the woman; and then it would be impossible to grasp the head at the superior strait, otherwise than in a line from the anterior fontanel to the nucha; in the third place, as the forceps would no longer be parallel with the curve of the pelvis, its concave edge would, during the tractions, of necessity press the vagina and bladder with violence against the pubis, while the ends of the blades would operate in the same manner, and still more certainly upon the soft parts behind. If, on the other hand, the head should be grasped only with the view of turning the occiput round to the front of the pelvis, as it would

be nearly impossible to act at the same time upon the trunk of the fœtus, we should succeed only in wringing the child's neck. In this, as in the occipito-anterior position, the forceps ought therefore to be so placed that its concave edge may look forwards, even though it may be turned towards the child's forehead, and not towards the occiput, as the general rule would require.

§ III. LEFT OCCIPITO-ILIAC POSITION.

1077. It does not appear to me that such a position, in the excavation, is admissible; but should it ever be met with at the superior strait, and require the application of the forceps, I do not see how we could dispense with following the precept of the German accoucheurs, unless indeed we should imitate M. Flammant, and proceed beforehand to take hold of the head with the hand and place it in a more convenient position; a proceeding much easier to recommend than to execute, in a majority of cases. The sacro-vertebral angle, the coccyx and the perineum would not admit of the instrument being placed transversely; at least, it would be absolutely impossible to extract in the direction of the axis of the superior strait.

1078. Admitting, however, that the case may occur, this is the advice given by the authors: the right branch of the forceps is to be introduced first, and conducted with the ordinary precautions, in front of the right sacro-iliac symphysis, as high up as the forehead; then the ends of the first fingers of the left hand are placed under its convex edge, and in concert with the right hand move it from behind forwards and from right to left, until its concave edge is turned towards the left iliac fossa, and the blade has arrived upon the right parietal protuberance. The handle, strongly depressed, is then given to an assistant, who holds it against the woman's left thigh.

1079. The left branch is held in the left hand, and passed up along the posterior part of the pelvis until its point is above the superior strait, and the pivot even with the mortise that is in the other branch. After having joined them and dislodged the head, if it be still in the superior strait, and forced the occiput to descend into the excavation, provided it were not already there, the concave edges of the instrument are gradually brought to the front, and the remainder of the operation is conducted as in the occipito-pubic positions.

§ IV. RIGHT OCCIPITO-ILIAC POSITION.

What I have just now said of the left occipito-iliac position is entirely applicable to the right occipito-iliac position; they only differ from each other in regard to the application of the forceps, in doing which the left branch is to be introduced first.

§ V. POSITIONS OF THE PELVIS.

It may happen that after the child has been drawn down by its pelvic extremity, great difficulty shall be experienced in attempting to disengage the head. The same thing may be met with at the close of a pelvis labour which up to that moment had exhibited nothing peculiar; if the fingers and hands do not suffice for the delivery of the woman, it will probably be found that it is occasioned by a contraction of the pelvis, more or less considerable, in which case the forceps may be of little avail. However, it must be tried, rather than resort to symphyseotomy or the Cæsarian operation, particularly provided the head is below the superior strait.

If the occiput is in front or a little to one side, an assistant should raise the trunk upwards, and first the left branch, then the right is introduced, following the same rules as if the head had descended first.

If it is behind, and it be found impossible to turn it round to the front of the pelvis by means of the hands, the fœtus is to be turned back over the perineum, and the branches of the forceps are still to be introduced as before.* But in extracting the head we should endeavour to act with sufficient force upon the forehead and chin to make those parts descend early under the symphyses of the pubis.

Lastly, should it be found on one side, the trunk ought first to be moved to the right or to the left, and then we should proceed as has been directed for the corresponding positions of the vertex.

Thus, in all cases, the trunk is to be turned towards the direction in which the occiput looks, and the forceps introduced along the sides of the head, in such a way that the concavity of its edges may be towards the front, or shall be brought there in the progress of the operation.

1080. It is easy to perceive that the presence of the trunk must add to the difficulties that are experienced in head presentations. Still, many practitioners have thought, that under such circumstances, the fingers might be beneficially substituted for the forceps, and that it is entirely useless to attempt its application where the head has not yet reached the excavation.

This seems to me to be dangerous doctrine. I know very well that a skilful accoucheur will generally triumph over the difficulties presented by this position without having recourse to the for-

* The woman should lie on her back, with the perineum projecting over the foot of the bed. If the body of the child be now supported in a vertical position by an assistant, it will be found that there will be space enough to introduce the forceps on each side of the face. I have, in general, found the application of the forceps quite as easy in a footling or pelvis case as in any vertex presentation.—M.

ceps; I am also aware that the forceps, here, cannot easily be applied to the head at the superior strait; but it is also undeniable that the head may be arrested at the superior strait by such a degree of contraction that the best combined efforts of the hand shall be insufficient for its extraction; but, why should not the forceps offer the same advantages in this case as in the positions of the vertex? Moreover, excepting symphyseotomy, what other means is there of extracting the *fœtus* alive? I will add, that, the trunk being without, and the head in some measure beyond the reach of the uterine contractions, any force exerted upon the body with the hand, and sufficient to enforce its passages through the organs, will generally act on the spine of the child to the extent of seriously compromising its existence, whereas the forceps does not expose it to the same dangers.

1081. Consequently we may have recourse to the forceps, in pelvis presentations, 1. When the head is stopped by the inferior strait only, and we are convinced that the powers of the hand alone would be insufficient, or too dangerous; 2. When the same part has not cleared the superior strait. But then, it must be engaged in it, or at least the face must be chiefly in the excavation, and it must be possible to reach the *os uteri* with some of the fingers. It is well understood, moreover, that in both cases, the chin must have been previously forced to descend, the head must have executed its rotation movement, and the shoulders must have been disengaged.

§ VI. THE CHILD IS COMPLETELY OR PARTIALLY DOUBLE.

1082. In cases where two children are united to each other at their anterior or posterior surface, and where two large heads are supported by a single trunk, it is possible that the efforts both of the woman and the accoucheur, although properly combined, may be insufficient to effect the delivery without the aid of the forceps.

If the trunk or the two trunks have escaped, it will be necessary, in order to admit of the application of the instrument, that one of the heads shall be in the excavation; nor, provided the monstrous *fœtus* should present by the vertex, ought this instrument to be rejected, although neither of the two heads should have cleared the superior strait. In the former case, that is to say, where the trunk is delivered, the head nearest the posterior plane of the pelvis ought to come down first, and in the latter, on the contrary, that one which is naturally turned towards the pubes.

Finally, the operation, if conducted agreeably to the general rules indicated higher up, would require no other precaution than that of raising the handle of the forceps forcibly upwards at an early period, and to pull, almost from the commencement, in the

line of the axis of the vulva. This would be the only way to avoid forcing the second head, still contained in the womb, to reverse itself, or to remain hitched, as it were, above the pubis or the sacro-vertebral angle.

§ VII. THE HEAD, SEPARATED FROM THE BODY, REMAINS ALONE IN THE PELVIS.

1083. Formerly so little care was taken in regard to the extractive force exerted upon the fœtus, when it was deemed necessary to deliver it footling, that it was not very uncommon to see the neck separate from the head and the trunk, being torn off during the violence of the exertions. At the present day this accident could happen only to the most ignorant or thoughtless practitioner; for it is never allowable to employ a force with the hand alone, sufficient to produce the occurrence. It is only where one of the passages, of size sufficient to admit of the transit of the trunk, is so contracted as completely to arrest the head, that it might perhaps become useful to separate the portion of the child that is without from that which remains enclosed within the genital organs.

But admitting that this necessity does exist in some cases, it still must be very rare, since the delivery of the body does not absolutely prevent the application of the forceps to the head; nevertheless, as we unfortunately meet with a good many persons who undertake the practice of midwifery without possessing the least knowledge of the subject, it would be imprudent for the educated practitioner not to reflect upon what he would do if called to a woman whose fœtus had been thus detruncated, either voluntarily or involuntarily, by immoderate pulling or by means of an instrument.

1084. In the first place, the head must be placed in a proper situation, that is to say, its occipito-mental diameter must be adapted to the axes of the pelvis, and the face turned backwards.

When in the excavation, it is almost as easy to get hold of it as if it were not separated from the body. At the superior strait, the operation is often found to be one of the utmost difficulty, and appears to be even impracticable, when the womb is scarcely contracted, and the face and occiput are not yet engaged. When the head is firmly fixed by the contraction of the uterus, or when it can be kept still with the hand so as not to slip out of the grasp of the instrument, we are to proceed just as if the body were still attached; only, in order to make surer of its not turning so as to put the occipito-frontal in place of the occipito-mental diameter during the process of extraction, we should endeavour to steady it by applying a couple of fingers of the hand that holds the root of the forceps near the vulva, to the face or chin.

§ VIII. RECAPITULATION, ON THE EMPLOYMENT OF THE FORCEPS.

In bringing this article to a close, I think it a duty to repeat the following corollaries:

1. The forceps ought never to be applied without an evident necessity, because, although it might not be mischievous to the child, the mother may receive the greatest injury from it.

2. In the practice of good accoucheurs the forceps is scarcely employed once in two hundred labours;* and as every thing tends to show that the ergot will be advantageously substituted for it in a multitude of cases, its employment will doubtless continue to be more and more rare. Most of those who make a more frequent use of it are not wrong merely because they perform an operation that is useless, but also, and especially because they needlessly derange the progress of a natural function; and because they voluntarily expose themselves to the risk of complicating the sequel of delivery, even admitting that they are sure of not wounding any organ.

3. The forceps cannot be beneficially applied, except to the head, either when it descends foremost, or when it follows the trunk of the body.

4. It is much more to be relied on for the purpose of grasping, and extracting the head, than for diminishing its size.

5. It is not allowable to introduce it into the womb until the orifice is sufficiently dilated, and the head ceases to be movable and loose above the superior strait.

6. As far as possible, the blades of the forceps ought accurately to embrace the two sides of the head in the direction of the occipito-mental diameter; nevertheless, where some difficulty or doubt is experienced, it is more convenient and more prudent to pass them up along the sides of the pelvis.

7. Except in the right occipito-iliac position, if it ever does occur and we should wish not to grasp the head by the occiput and forehead, the left branch must always be introduced first, because it is the undermost.

8. In whatever manner the branches are introduced, their concave edges must be ultimately brought in front; but if the head had been seized by the ends of its occipito-frontal diameter, and had not, while descending, rotated between the clams of the instrument, it must be abandoned at the inferior strait, to be taken

* Dr. Collins, page 10, tells us that during his mastership of the Dublin Lying-in Hospital, in 16,414 deliveries the forceps was used only 24 times, and the lever three times, making 27 cases in all, or one case in 608 deliveries. It is to me inconceivable, that, viewing the class of the population which resorts to that institution, many more examples should not have occurred requiring the application of the instrument. Perhaps, had the forceps been less timidly resorted to, the ratio of cures or recoveries already so honourable to that house, would have been still more creditable to it.—M.

hold of more advantageously, should the forceps still continue to be necessary.

9. The extraction should always be performed in the line of the axes; always with gentleness, never precipitately, nor by jerks; the tractions from handle to handle are of no use after the head occupies the vulva, and if performed while it is at the superior strait, would sometimes be dangerous.

10. It is not only because it has become useless that the instrument should be taken off when the head, at the lower strait, is only resisted by the soft parts, but also, and chiefly, in the view of avoiding laceration of the perineum, and allowing the vulva to dilate more slowly and regularly.

ARTICLE III.

OF THE LEVER.

SECTION 1.

Of the Lever in itself considered.

1085. Herbiniaux, and Denman, the British Baudelocque, have decidedly maintained that the lever is incomparably superior to the forceps; and notwithstanding that it has not been so highly thought of in France, it has occupied much of the attention of the physicians of our country since the middle of the last century.

1086. Its inventor is no better known than that of the forceps. Was the idea of it derived from the *uncus* of Celsus or the *curette* of the lithotomists? Is it the instrument made use of by the Chamberlains, as Mulder pretends, or the spoon of Palfyn, or one of the branches of Smellie's forceps, variously modified? Still it is true that Roonhuysen, who made a secret of it, acquired celebrity as an accoucheur, by means of a peculiar instrument, since used under the title of *Roonhuysen's lever*. This instrument, which, from Roonhuysen passed into the hands of Bruyn, was purchased and made public by De Vischer and Van de Poll in 1753; but, as was the case with regard to the forceps, a great number of very discrepant accounts of it appeared in the course of a short time; there was soon a lever by Boom, another of De Bruyn, a third by Titsing, one by Palfyn or Heister, one by Cole, one by Griffith, a lever by Wathen, one by Aitken, &c. There was no less discrepancy upon its mode of acting: according to some it was to be applied to the occiput, *potentia agit in os occipitis*, was the family

secret; according to others it was to be applied to the temples. Titsing directed it to be applied to the mastoid process; and lastly, others thought it should be fixed upon the side of the chin. As to its advantages, if De Bruyn was to be believed, they were immense, no difficulty could withstand it, whether the head were reversed, arrested or locked, the lever triumphed over them all, and by means of this marvelous instrument, the Dutch accoucheur pretends to have unlocked eight hundred heads in the course of forty-two years. The French authors have, on the contrary, maintained that it is only useful in correcting the positions of the head, in compelling the reverted occiput to replace itself at the centre of the pelvis.

1087. However this may be, instead of a bar of steel about ten inches long by an inch and a half in breadth, curved at each end like a spatula, enveloped in adhesive plaster, according to De Bruyn, or chamoy leather, as Boom says; instead of a simple spatula or kind of flat spoon, the handle of which was terminated by a broad ring, which constituted the lever of Titsing, the modern lever, such as it appeared when modified by Pean and Baudelocque, is nothing more than one of the branches of Smellie's forceps, very much elongated, without its notch, and very little curved. This stock, the blade of which is very widely fenestrated, and the root supported by an ebony handle, has also been itself modified in a great variety of ways by the moderns, either in regard to its length, or the degree and shape of its curve, or because some have added a joint in the stock, so as to bend and make it more portable.

SECTION 2.

Use of the Lever.

1088. Subsequently to the idea originated by the axiom of Roonhuysen, and which has particularly been adopted among us, it was generally agreed that the lever is not destined to supply the place of the forceps, that at most it can but serve to restore the flexion-movement of the head, by hooking down the occiput; thenceforth its employment necessarily became much restricted, for under those circumstances the fingers almost always suffice, and if, after all, any instrument were necessary, one of the branches of the forceps would answer as good a purpose as the lever itself.

But this is not the view the English accoucheurs take of the subject, nor that taken by its inventors, nor indeed is it a correct one.

1089. The lever is an instrument that is applicable to two different objects: on the one hand, it may be employed for the purpose of restoring or reducing the head to its natural position; and on the other, it is possible to make use of it, as we do of the forceps,

to extract the head when it has descended into the excavation.—In the former case, the fingers, or one branch of the forceps, might, strictly speaking, in most circumstances, be substituted for it: but, in the latter, I am convinced that it is susceptible of advantageously taking place of the forceps, and that pretty frequently. In the first case it acts upon the occiput, or on a parietal protuberance, like a simple crotchet; in the second, it really performs the office of a lever of the first kind.

As a crotchet, the lever offered for sale by the different cutlers in the vicinity of the *Ecole de Médecine*, and which is very nearly the instrument modified by Pean and Baudelocque, leaves nothing to be desired; as a lever, I prefer one that is rather shorter, and that may shut up by means of a hinge joint, which does not at all diminish its strength; further, it ought to be straight from the extremity of the handle to within about three inches of the end of the blade; the latter should be broad, oval and ending in a long flat root, which narrows, gradually, to continue into the handle; its curve should be considerable, at least greater than that of the forceps; with the exception of the middle part, its concavity, that which ought specially to bear upon the head, it ought to be very well polished; and lastly, in the construction of such instruments the best steel ought to be selected.

§ I. USE OF THE LEVER AS A CROTCHET.

1090. If then it be intended to make use of the lever in conformity to the principles of the French authors, it must be taken hold of with the right hand for the right occipito-iliac position, and with the left hand in a case of the left occipito-iliac position, and with either hand in the antero-posterior positions. Introduced with the same precautions as if it were one of the branches of the forceps, it is passed up between the surface of the genital organs and the child's head, until it gets beyond the occipital projection or parietal protuberance, and in such a way that its concavity may be easily applied to one of the parts above mentioned; as, in the occipito and fronto-pubic positions, it is impossible to pass it up directly behind the occiput, it must be at first carried a little to one side, and afterwards conducted on to the part which it is intended to depress; when it is well placed, the hand that directed the blade takes hold of the root of the instrument; in order to make sure that it shall not slip, and that the back of it shall not rub against the soft parts of the woman, the operator should employ the extracting force with the hand that holds the handle, in a direction backwards, forwards, or sideways; in short, in a direction opposite to that pointed to by the protuberance which he wishes to depress. In general, the interval between the pains is to be selected for acting: and as soon as the vertex has reached the centre of the pelvis, the operation is complete; the instrument is to be with-

drawn, and the labour abandoned to itself; or, if necessary, other means of assisting it are resorted to.

§ II. OF THE LEVER USED AS A LEVER.

1091. The use of the lever, after the manner of the Dutch and English accoucheurs, that is, as a substitute for the forceps, is very simple as to its mechanism: in the first place, it is best that the head should be in the excavation; then that it should have already, or at least chiefly, executed its pivot-movement; in the third place, that there should be but a slight degree of contraction of the inferior strait, or that the retardation of the labour should depend solely upon a want of action of the womb, or of the woman herself. Whatever may be the position of the head, the right hand must be made use of for extracting with, at least in all cases where the accoucheur is not left-handed; for the purpose of introducing it, we have recourse to the right hand, if the lever is to be passed upon the right side of the pelvis, and to the left hand in the contrary case.

1092. Where the occiput is in front or somewhat to the left, the left hand introduces the lever, as if it were the right branch of the forceps, in front of the right sacro-iliac symphysis; when it has passed up sufficiently far, the action of the two hands is combined so as to guide the concavity of its blade on to the right temporo-parietal region, that is to say, in the direction of the occipito-mental diameter, and on the same parts that would be embraced by the corresponding blade to the forceps. The left side of the vertex is supported by the fingers of the left hand; the thumb, placed near to the vulva, embraces the back of the lever, to which, conjointly with the right side of the pubic arch, it serves as a *point d'appui*; we are now to wait for a pain, and then draw down slowly but strongly, as if we were making a lever of the first kind swing from below upwards, and from left to right; the head generally yields readily; it is gradually drawn down in the axis of the inferior strait, which it clears as it executes its extension-movement.

In this way the force exerted upon the head acts in a direction from the chin towards the occiput, or in that of a line drawn from the angle of the right jaw to the left side of the vertex; so that, as it is supported elsewhere by the left side of the pelvis, there is nothing surprising in the circumstance that it allows itself to be so easily extracted.

1093. Should the occiput be on the right side, in the second position, for example, the lever ought to be introduced with the left hand; but then it must be changed, as above, and the right hand seizing the handle of the instrument, should also extract in the same manner, with this difference only, that the see-saw movement should take place from right to left, and not from left to right.

Should the vertex be turned backwards instead of towards the front of the pelvis, the lever ought to be applied to the temporo-parietal region, in the direction of the occipito-bregmatic diameter, and the see-saw should be performed in such a way that the occiput, which ought here to support the principal effort, may escape first in front of the perineum, and be strongly raised towards the centre of the vulva; this position is less favourable than the other, without doubt, but still it is not very difficult.

1094. I know that what the lever effects under these circumstances could be equally well done by the forceps, and perhaps with more certainty; and indeed, it is not my design to substitute the former of these instruments for the latter; I have merely wished to show, that among us, the mechanism of the lever has been generally misunderstood; that its employment, without being indispensable, is perhaps not to be despised; and that its application is too simple, too harmless, as compared with that of the forceps, for it is not to be had recourse to where the head presents at the perineal strait, and appears to be arrested only by want of action of the woman's organs; I will even add that its introduction will often be attended with the great advantage of exciting the uterine contractions, as well as those of the abdominal muscles, and thereby of accelerating, at least indirectly, the termination of the labour, without exposing either the woman or her child to any danger; I am happy, moreover, in finding myself supported in almost the whole of this doctrine by M. Désormeaux.

ARTICLE IV.

OF THE FILLET.

1095. The noose consists of cloth, thread or silk, wool, leather, or cotton, sometimes strengthened by the addition of bulrushes, whalebone, brass-wire, or plates of iron or steel, variously interlaced and worked, and which was formerly applied to different parts of the fœtus, so as to effect its extraction. The employment of these means is of very ancient date, and doubtless extends back as far as the age of Hippocrates. Previously to the discovery of the forceps and lever, the noose and fillet were the only instruments made use of for the extraction of the child, where there was some hope of preserving its life. Avicenna recommends that they should be applied to the trunk; but it was particularly with a view of fixing it upon the head that Mauriceau, Pugh, Smellie, Burton, and others thought of a sort of purses, sheaths, or caps, slings, and little bands which are now wholly forgotten. If the forceps is a substitute for all the various nets that

were formerly applied to the head, turning by the feet, which is better understood, and especially better executed than it was previously to the last century, also renders superfluous all the fillets which certain accoucheurs used to apply to the trunk for the purpose of extracting it artificially; so that at present the noose is merely a strip of linen, silk, or worsted, about an ell in length and an inch wide, by means of which a limb that has escaped from the organs is secured, while we proceed to search for the other one, or the rest of the fœtus. Some persons, however, still make use of it for the purpose of employing extractive force upon the ham, the groin or the axilla; but as the blunt hook or fingers always offer us greater advantages, they are really useful only when applied to the wrist or ankle in arm presentations or in turning and delivery by the feet.

1096. In order to apply it, the strip is in the first place to be doubled; then a slip-knot is made upon it and held apart with the end of the thumb and two or three of the fingers of the hand which is to take hold of the foot or the hand of the fœtus; after this, it is slipped up and secured with the other hand, the noose being fixed above the articulation of the tarsus or carpus; it is then given in charge to an assistant who is to hold it, but without pulling it, while the operator proceeds to search for the other parts that he wishes to bring down to the inferior strait. When both of the lower limbs have been brought down there is no further use for the noose, provided it had been secured upon the leg; if it is upon the wrist it may still be of service in keeping the arm extended along the body, and consequently in favouring the delivery of the corresponding shoulder. To conclude, the noose is a means whose application at the present day is confined within extremely narrow limits, and whose mechanism is too easily understood for it to be needful that I should say any thing further about it here.

ARTICLE V.

OF THE LOCKED-HEAD.

1097. According to Peu, who was the first writer to speak of it, the head is *locked* in the passage whenever it is firmly held betwixt the pubis and sacrum, without being able to advance or recede, and so that it is almost impossible to apply the instrument to it. According to De la Motte, the head, when locked, is griped by the bones of the pelvis, like the key stone in an arch. Rœderer presents another view of it: he thinks that in order to constitute locked head, the head must be so embraced in the strait, or in the excavation, by every point of its circumference, that a

lamina of metal or the smallest probe cannot be passed between it and the organs of the woman. Baudelocque says that the head is locked, whenever it is fixed at the superior strait by the two extremities of one of its diameters, so that it can neither advance under the influence of the natural powers, nor be forced back by the hand of the accoucheur. Baudelocque's definition, which has been adopted by all modern accoucheurs, and slightly modified by M. Désormeaux, is without contradiction the most correct, and may be construed as follows: the head is locked in the pelvis whenever two diametrically opposite points of its superficies are so compressed that it cannot possibly descend under the influence of the expulsive power alone, and when it cannot be pushed up without the very greatest difficulty. The locked-head, according to the view of it presented by Ræderer, or *paragromphosis*, cannot possibly occur. Madame Lachapelle will not even admit the existence of any species of it, and thinks that all that has been written under that title ought to be referred to vicious conformations of the pelvis, to bad positions of the head, or, lastly, to powerful and permanent contractions of the uterus.

1098. However this may be, locked-head has become very rare at the present day, and De Bruyn, who pretends to have met with eight hundred cases of it in the course of forty years, Berkman and Titsing, who cite two hundred and sixty-two cases in nineteen years of practice, must have had a different idea of it from ours. It is to me evident, from the accounts given by Camper on this subject that the Dutch accoucheurs gave the denomination of locked-head to all cases in which the head, from being arrested in any way in the pelvis, makes the employment of Roonhuysen's lever necessary; so that what they have said concerning locked-head has almost no connection with what has since been written by Baudelocque under that title. Dr. Dewees, who treats of locked-head upon the principles of Baudelocque, is astonished that he scarcely ever meets with it, and thinks that the circumstance depends upon the American women having better formed pelves than the European women; but he would probably hold a different language if he knew that Madame Lachapelle never met with it at all, and that but a few instances of the kind are met with in the course of a year.

1099. In the first place, the case where the head is simply fixed at the superior strait, because the liquor amnii has been long discharged and the womb is closely contracted upon the body of the child, must not be confounded with locked-head, nor that case where it stops in the excavation, betwixt two very contracted straits, and after having with great difficulty cleared the superior pelvic circle, nor those in which its escape is prevented by the resistance of the perineum or narrowness of the inferior strait.

1100. The head can scarcely become locked except between the pubis and the sacrum, at the superior strait; further, in order that it may happen at all, the conjunction of a great number of conditions is required: 1. That it shall present in a direct manner; 2. In a well-formed pelvis, it must be of enormous size; 3. The narrowness of the pelvic cavity shall not exceed a certain degree; and there shall be a space of two inches and a half between the sacrum and pubis for an antero-posterior position, or three inches for a transverse position; for, locked-head cannot take place except where the head can get as low down as the level of its greatest thickness; 4. The uterine contractions must have been energetic.

Among these conditions there is one upon which I must dwell for an instant. I find a difficulty in conceiving how the occipito-frontal diameter can really get fixed in this way in the sacro-pubic diameter. The ends of the lever, which it may be considered to represent, are too unequal for its occipital portion to fail to come down first, especially when the efforts of the woman react violently upon it through the intermedium of the vertebral column; it seems to me, then, much more probable that it is the occipito-bregmatic diameter that becomes locked, and that the head may be retained betwixt the sacrum and pubis, as well by any one of the other diameters of the occipito-bregmatic circumference as by the bi-parietal diameter alone.

We may further admit, along with M. Désormeaux, that locked-head may sometimes take place in the excavation, when the sacrum, flat, or nearly flat, makes the head pass along a canal that gradually diminishes in size, as it descends, until at last it cannot turn upon its axis, nor advance nor recede, beyond a few lines, towards the superior strait.

1101. Tumefaction of the lips of the os uteri and external organs of generation, and extreme degree of swelling of the hairy scalp and over-lapping of the cranial bones, have been given out as signs of locked-head; but most of the phenomena may take place without the locked-head, and are therefore no sufficient basis for a sure diagnosis.

The pathognomonic sign, in these cases, is derived from the fixedness of the head, which, in spite of the energy of the pains, makes no advances for several hours together. While the pain is present, it seems to advance a little; but immediately afterwards it rises again up to the same point it occupied before; if the accoucheur endeavours to push it up again with his hand, he finds that it is immovable, and cannot succeed in dislodging it but with the greatest difficulty. It should also be understood that, by elongating, the head may appear to descend, and approach near to the vulva, although its position does not really undergo any alteration. This circumstance must be what has so often

deceived the accoucheur, making him suppose that the superior strait was cleared, while in fact the occipito-bregmatic circumference was not as yet engaged in it. An examination is made; the vertex is found a few lines from the vulva, whence the conclusion is drawn, that it has descended into the excavation: to avoid this mistake, and understand it, the practitioner should remember, 1. That the symphysis pubis is only from eighteen to twenty-four lines in depth, and, consequently, that the swelling of the cranial integuments may easily bring the vertex down even with the vulva, although the parietal protuberances are still at the superior strait; 2. That the finger must be carried backwards, especially, and not merely in front, when we wish to ascertain what part of the pelvis is occupied by the head; and 3. That the locked-head may take place below the superior strait.

1102. There are several degrees of this cause of dystocia: sometimes the disproportion between the head and pelvis is so small that it only results in a somewhat slower labour and more fatigue for the woman; at other times it is so great as to render the delivery excessively difficult, but absolutely impossible without assistance, provided the contractions are well sustained; again, lastly, it is so great that nature is absolutely unable to triumph over it, and the resources of art become indispensably necessary.

In the case first mentioned, the locked-head is not very dangerous, and ordinarily is accompanied only by a slight degree of irritation and disposition to inflammation.

In the second and third, it constitutes a serious accident, both as regards the mother and the child. The pains, which follow each other to no purpose, though strong and frequent, at length end in a state of general exhaustion and inertia, should the woman even be so fortunate as to escape an attack of inflammation of the womb or peritoneum, a flooding, or convulsions. The bladder, the rectum, the vagina, the urethra, and other soft parts in the pelvis, from being long and severely compressed, may become contused, ulcerated, or gangrenous, and give rise to fistulæ that are too commonly incurable, or to some other alteration equally terrible. The compression of the nerves, and of the vessels in particular, may give rise to paralysis, tumefaction, and the infiltration of the lower limbs and vulva; the symphyses themselves, from being violently distended, occasionally run some risk, where the expulsive efforts are vigorously sustained.

The long continuance of the labour after the discharge of the waters, and the direct action of the contractions upon the body of the child, expose it, in the first place, to the same accidents as all long and difficult labours, that is to say, to asphyxia and death. Again, the head, particularly where the pelvis is badly formed, as the sacro-vertebral angle is very salient, cannot adapt itself to the

straits or excavation, as in a mould, without the brain itself undergoing a dangerous, and sometimes fatal compression. It may also be followed by fractures, and external or internal extravasations, lacerations, &c.

1103. It is clear that, in order to avoid so many dangers, the practitioner ought promptly to interpose for the assistance of the powerless organism; but by acting speedily there is risk of acting unnecessarily; by waiting he may lose the opportune moment; how then are these two extremes to be avoided? The well-informed physician will readily succeed in this difficulty by taking care not to lay it down as a principle, as has been recently done in some medical journals, doubtless from oversight, that he must make haste to extract the child with the forceps, whether the head is locked or not, whenever it has remained an hour or two in the excavation; the woman ought never to be assisted in this way until there is a certainty that the head will not pass the passages spontaneously, or that the delivery will not take place without exposing the patient to the accidents heretofore indicated.*

1104. Turning by the feet, as recommended by the ancients, must not be performed merely because the head is really locked; the slings, bandages and fillets would in such cases be wholly insufficient, and are at present no longer recommended by any body. The lever, the spatula, and the separate branches of the forceps, so much lauded by the accoucheurs of the last century, were successful only because they were employed in cases very different from those which are understood to be locked-head at the present day. Roonhuysen's instrument is manifestly incapable of compelling the head to descend, where there is a disproportion between it and the straits; it might, at the most, serve to dislodge it and give it a more favourable position, and in that case it would not be absolutely locked.

1105. It is otherwise with the forceps, which admits of the efforts of the accoucheur to be conjoined with those of the womb and abdominal muscles. However, as the clams can be applied only upon the sides of the pelvis, some practitioners have objected that by compressing the head in a line from right to left, this instrument might augment the pressure already experienced from front to rear, instead of diminishing it; that it is better calculated to give rise to locked-head than to relieve it; and consequently, more dangerous than useful; but these fears, inspired by theoretical views of the subject, must yield to facts; besides, it is not

* From reading this sentence one might infer that the forceps are applicable only for the safety or comfort of the mother; but, surely, the security of the offspring demands a share of our attention, and the legitimate uses of the instrument are as frequently connected with the infant as with the parent.—Many children are rescued from death by speedy delivery with the forceps, the instrument being employed solely in their behalf.—M.

correct to say that the diameters of the head gain by compression in one way what they lose in another; I repeat that I am certain the forceps succeeds in extracting the locked-head far more by compelling it to traverse a circle, which acts upon it like a ring, than by reducing it by means of a direct pressure.

Should it not succeed, and the child were ascertained to be dead, recourse should be had to cephalotomy, and then to the crotchet; but if the fœtus were still living, the operation of symphyseotomy would be indicated, and ought to be preferred to the Cæsarian operation, which, in such a case, can never be necessary.

ARTICLE VI.

OF THE MEASURES RENDERED NECESSARY BY NARROWNESS OF THE PELVIS.

When the pelvis is so deformed as to render delivery impossible, even with the assistance of the means I have now passed in review, there remain only three kinds of resources for the delivery of the woman: 1. To act upon the fœtus so as to lessen its size; 2. To increase the size of the pelvis; 3. To extract the child by an artificial passage. As these three modes of delivery are excessively dangerous, whether to the mother or her offspring, it is necessary, previously to putting them in practice, to determine in what cases they are really indispensable.

1106. To attain this object, the accoucheur ought to know the exact dimensions of the head and pelvis, in those diameters which correspond to the diameters that correspond to each other in the different stages of labour; also, to know how far the head is capable of being reduced, and what amount of courage and energy is likely to be exhibited by the woman; but these notions can only be acquired approximatively. Notwithstanding the numerous cephalometers, proposed by various authors, and in spite of the means recently indicated by M. Foulhoux, we must still depend upon the finger for the most certain result under such circumstances: and, with the exception of M. Flamant, what practitioner is so bold as to dare to pronounce that the dimensions of a head he has just examined are, within from two to three lines, of precisely such or such an amount? The degree of solidity of the pelvis, the form of the contracted strait, and the direction of its axes, also deserve the most serious attentions: for example, the symphysis may be softened to such a degree as to admit of the bones sliding one over the other, so that one os pubis may extend in front, while the opposite coxal bone falls backwards, which would render the corresponding oblique diameter so much

longer. According to Deventer and Madame Lachapelle, the two hip bones may also be both carried forwards by the forcing of the sacrum into the space between them, and thus give rise to an unexpected augmentation of the sacro-pubic diameter. If the superior strait is of the shape of a figure 8, or if the contraction occupies only one side, the head being situated transversely, with the occiput towards the widest part of the pelvis, may sometimes traverse the canal notwithstanding a considerable degree of contraction.

Where the axis of the strait approaches that of the spine, the two extremities of the bi-parietal, or the occipito-bregmatic diameter will be compelled to engage at the same time, and will require a space of about three inches. Should it, on the contrary, be very much inclined to the front, one of the parietal protuberances might engage before the other, so as to give a gain of three or four lines in the act of passing through the pelvic circle.

On the other hand, a head that is very flexible, and energetically urged onwards by the uterine and muscular contractions of a vigorous woman, may be elongated and moulded in the passages, be considerably reduced (Denman says, to one-third of its original volume), and, according to Baudelocque, attain to the length of eight inches, while its thickness is proportionably diminished; it may become so much flattened as to pass through a strait of two inches and a half, and recover its ordinary volume within the excavation, if we may give credit to the assertions of De Boer; and, in all cases, admit of the child's being born alive. Lastly, how many women are there who have been fortunate enough to bring their children into the world without any aid, when in their previous confinements they could be delivered only by symphyseotomy, the Cæsarian operation, or embryotomy! Here, then, the operator stands in need of all the integrity of a sound judgment, of prudent and sage counsels, of attention to a thousand diversified circumstances, and of proceeding only with extreme caution, if he desires not to compromise the dignity of his art, or the safety of those beings who look to him for the conservation of their existence.

1107. Instead of accommodating itself to the form of the openings, the head may be fractured, or the brain mortally compressed. Long-continued pressure upon the fœtus, and particularly upon the umbilical cord, which most commonly gets down into the excavation, rarely permits it to escape with its life; the woman herself soon becomes exhausted; the bladder and other soft parts, against which the head presses with great violence, may inflame, be lacerated or perforated; the womb, violently irritated, by its repeated contractions, may be ruptured, and death ensue. The softening and separation of the symphyses often leave behind them a movable state of the articulations, and a degree of lameness

which are at least very troublesome, and where the distension is carried to a great extent, are often followed by caries and abscesses, which sooner or later terminate in the death of the patient. There are, therefore, two evils, which it imports to avoid with equal care; there is a just medium we should endeavour to secure.

1108. Let us suppose that the application of the forceps and turning have been attempted in vain, or that the pelvis is so deformed, that no greater confidence is to be placed in those means than in the efforts of the woman, one question presents itself; on whom shall we operate—the child or the mother? Where there is a certainty that the pelvis is so contracted as to render the delivery of a mature and full-grown child either dangerous or impossible, have we a right to bring on abortion, either at an early stage of pregnancy, or only between the seventh and eighth months. Would it not be possible, by means of regimen, or of a debilitating treatment, to oppose to a certain extent, the development of the fœtus, so that at full term it shall be of a very small size?

SECTION 1.

Of Regimen, as a means of enabling women with contracted pelvis to be delivered without the assistance of any surgical operation.

1109. Were it true that the strength of the fœtus while enclosed in its involucre is always in proportion to that of the mother, nothing would be more natural, nor better indicated, than to weaken a deformed woman during the progress of her pregnancy. But as the most robust women do not always bear vigorous children; as those who are naturally feeble and sickly often give birth to very stout and large ones; it is to be feared that the severest diet and most abundant sanguine evacuations, would only serve in such a case to incapacitate the woman from supporting the operations that would notwithstanding be requisite when she should fall into labour. I know one person who, having been delivered twice by means of art, was bled ten times, and confined to a vegetable diet during her third pregnancy, with a view of retarding the growth of the child; this lady was, it is true, exceedingly weakened by it, but the fœtus did not appear to have been affected, and in parturition she required the same succours as before. Another woman who had two very fatiguing pregnancies, and could not be delivered until after three days of painful labour, and then by means of the forceps, also became pregnant for the third time, found herself less incommoded than usual, and was, nevertheless, delivered without assistance, and without difficulty, of a child sensibly smaller than the preceding ones. I am well aware that practitioners worthy

of credit assert that they have obtained directly contrary results, and I can well conceive, as a general rule, that by exhausting the woman, the growth of her offspring will be retarded. But there are so many exceptions to this rule, and what we gain on the one hand so disadvantageously compensated by the loss of resources of which we deprive ourselves on the other, that I would scarcely venture to recommend such a course except to persons affected with a very slight degree of contraction, and in whom delivery might, in fact, take place spontaneously, should the head of the fœtus not be very large.

SECTION 2.

Of Abortion, brought on for the purpose of rendering symphyseotomy or the Cæsarian operation unnecessary.

1110. It was about the middle of the last century that the most distinguished physicians of London decided that, in women affected with deformity of the pelvis, it is proper to solicit delivery as soon as the viability of the child is well established; according to the statement of Kelly, Macaulay was the first person who had recourse to this operation which resulted favourably in his hands; since then Dr. Barlow has published a memoir in which he essays to prove that artificial abortion ought to be substituted for the Sigaultian and Cæsarian operations in all cases. Ramsbotham says he brought on abortion three times with success in a woman in whom the perforation of the fœtal head had been deemed necessary in a preceding pregnancy; Drs. Davis, Clough, Wigand, and very recently, Bang, and Dr. Blundell, have supported the doctrine advanced by Barlow. M. Costa has even inquired whether it is proper to resort to it in the cases of women affected with aneurism of the heart.

1111. In France, this question has been considered under a point of view which has not admitted of its value being discussed. It has been said that no one has a right to destroy a living fœtus, even in the first months of its existence. But delivery, when provoked previously to the seventh month, kills it inevitably, and rarely fails to cause its death in the seventh and eighth. Besides, if it must be destroyed, why not wait for the term of labour? by so doing we shall at least not destroy the few chances we have of seeing the labour come to a favourable conclusion.

For my own part, I confess I cannot possibly balance the life of a fœtus of three, four, five, or six months, a being which so far scarcely differs from a plant, and is bound by no tie to the external world, against that of an adult woman whom a thousand social ties engage us to save, so that in a case of extreme contraction, if

it were mathematically demonstrated that delivery at full term would be impossible, I would not hesitate to recommend abortion in the first months of gestation.

But the case is different whenever there is a space of two inches and a half, at least between the sacrum and the pubis: as in that case the ovum has been seen to come away without assistance, and the fœtus born alive, the honour of the art and humanity combine to forbid the employment of any destructive instrument, or any attempt that must end in the death of the child.

1112. The inducing of labour at the seventh month would be particularly applicable where the pelvis is two inches and a half at least and two inches and three quarters at the utmost, because it is clear, from measurements taken by Madame Lachapelle, that at seven months the bi-parietal diameter is at most not over three inches, and may be much less in extent; which gives the same chances as if the delivery were to take place at term, and through a strait of three inches and some lines. But how are we to learn accurately whether the fœtus is viable? If, for greater security, we should defer the operation till two weeks later, what assurance could we have that the head is not already too large to pass through the straits? And if it can clear them at eight months, is it not probable that it will succeed equally well at the end of the ninth?

I am far from thinking that the difficulty consists in penetrating as far as the membranes so as to rupture them; nevertheless, wounds of the uterus are so dangerous, that we should always dread to introduce an instrument into its interior: and then it would be a strange misconception to suppose that abortion brought on in this way is not more dangerous, *cæteris paribus*, than a delivery at full term: without mentioning the hemorrhages, convulsions, or inflammations of the peritoneum, that are but too frequently the results of the operation, we ought also to expect the fœtus to perish either before or soon after birth, in a large majority of cases. Being scarcely viable, it is too feeble to bear the contractions of the uterus. Although, after the membranes are perforated, the womb, sometimes, enters powerfully into action, it also happens that it remains two, three, and even as many as fifteen days, before it begins to react upon the product of conception; besides, its contractions are generally slow, feeble, and too far apart to expel it when its size is considerable.

Unless a very slight value is attributed to the life of the fœtus, this recourse is, then, of small advantage; at least, previously to making a general precept of it, it deserves to be maturely considered by unprejudiced men, and in a more philosophical way than seems to have been done hitherto in England and in Germany.

1113. *Signs of the death of the fœtus.* There is no doubt that the fœtus is still living if it moves, or if auscultation enables us to

hear the movement of the heart ; there is, also, no doubt of its being dead when portions evidently belonging to its structure, and in a state of putrefaction, escape from the organs ; but with the exception of these cases, which leave not the slightest uncertainty upon the subject, the question of life or death is, here, one of the most delicate subjects in physiology, and one of the most difficult of solution of any in tokology. The same thing takes place in regard to the death of the fœtus as occurs in relation to the question of pregnancy ; it is announced by numerous signs, but they are extremely variable and never certain. How could it be otherwise, inasmuch as it is sometimes impossible to pronounce upon the state of the fœtus that has just been born, and that is before our eyes ?

However it may be, the signs of death may be divided into rational and sensible, like those of gestation. The rational signs are observed before or during labour.

1114. Previously to reaching the full term the woman has had a fall, or has made some violent movement or strong effort ; she has struck her abdomen against some solid body ; she has used too much ardour in coition ; she has abandoned herself without reserve to vivid impressions of a moral kind ; she has had a severe attack of disease, has taken very active medicines ; in fine, she has exposed herself to some one of the causes that are capable of producing abortion ; in which case there is some reason to presume that the child is dead ; provided she should, shortly after the accident, have had rigors, nausea, a sense of weight above the middle of the pelvis, disgust, horripilations, or a sense of coldness in the belly. If the breasts are enlarged, full of milk, or shrunk ; if the womb tends towards the lowest part of the body, and moves to the right, left, or in front, like an inert mass ; if the fœtus has ceased to exert any active power ; if the abdomen ceases to enlarge ; if the mouth exhales a putrescent odour ; if there is a general uneasiness, or a constant febrile state, it becomes extremely probable that the fœtus is dead.

1115. During labour the death of the fœtus is announced by the escape of the meconium ; by the entire absence of motion ; by a putrid odour that escapes from the vagina, or rather from the uterus, along with the waters ; by the diminution of the labour pains, and by most of the phenomena which I mentioned just now. There is reason to fear it, especially, where the amniotic fluid has escaped prematurely, or at least where it has been long evacuated, and where the position is bad ; or where the contractions of the womb have in any way borne directly upon the fœtus itself. The sensible signs are not appreciable until some portion of the ovum itself can be touched with the finger. Among them is classed the premature descent of the cord, and the absence of its pulsation ; inability to excite motion in the fœtus, although it be raised up in

the womb; the escape of shreds of the cuticle; the want of a soft elastic tumour on the head; mobility of the cranial bones; the slight resistance offered to pressure by the thorax or any other part; the absence of pulsation in the heart, &c.

But it must be confessed that, perhaps, not one of these signs, taken singly, would be to a prudent man, a sufficient warrant to pronounce unhesitatingly on the death of the fœtus; indeed very few of them deserve much consideration. It is only when united, when constituting a whole, that we are sometimes warranted in drawing pretty rigorous conclusions: the swelling of the breasts and their subsequent shrinking away may occur, although the child continues to live; but this sign will, notwithstanding, be very important, if it coincides with a majority of the other rational signs, because, says M. Dubois, when the child dies, its delivery, regarded as the completion of the great act of reproduction, is in some sort, effected for the sake of the economy, and the secretion of milk tends to take place just as if the ovum were expelled. The same may be said as to the disagreeable load felt by the woman in all her movements, and the sense of weight which she experiences in the bottom of the pelvis.

The waters may have been evacuated for three, four, ten, fifteen, thirty,* and even fifty-seven days, according to Bauhin, Boer, and M. Morlanne, without being necessarily followed by the death of the fœtus; but the contrary will, however, much more commonly be met with. If the meconium escapes, and the pelvis is not the presenting part, there is great reason to fear that it is dead, although more than one case has been seen where, under such circumstances, the fœtus has been born after several hours, strong and healthy: when the breech comes down first, there is nothing unnatural in the discharge of the meconium which is occasioned by the pressure experienced by the belly as it passes through the os uteri, or the straits; it is altogether a mechanical effect. But when the head is the presenting part, the same cause no longer exists, and, in general, the bowels are not evacuated, unless the sphincters, by being weakened, like the other muscles, relax so as to oppose no resistance to the action of the womb, which will scarcely take place unless the child is near expiring. Lastly, the practitioner ought not on this subject to let himself be imposed on by the muddy appearance or greenish colour of the waters; for this is an appearance often assumed by them without the meconium having any thing to do with it.

1116. A living fœtus sometimes suddenly ceases to move alto-

* In one case that I attended, as accoucheur, the membranes were ruptured and the waters escaped twenty-nine days before the child was born, which, nevertheless, came forth in a vigorous and healthful condition.—H.

gether, and may remain several days or weeks, or indeed until its birth, without moving, and yet may not have incurred any danger : on the other hand, the woman often supposes she feels it move after it has really been dead for a long time, and I could relate many cases of the kind, one of which I very lately saw with Dr. Leseble, in a young woman who gave birth to a child that had been dead at least four or five days, although she told us an hour before the delivery that she felt it move. But this does not prevent the sign from being a very important one to the practitioner who knows how to estimate it, and when, in the course of a long and difficult labour, the motions of the child are found suddenly to cease after having been agitated with more or less violence, and, as it were, convulsively, there is good reason to fear for its safety.

Portions of the epidermis, and some of the hair, might, indeed, become detached from some inflamed, gangrenous or ulcerated point, without the child being dead : if this sign depended upon putrefaction, it could in no case occur until after life had long ceased ; in fine, I can scarcely believe that any one could be deceived who should pay a careful attention to all the circumstances.*

1117. The odour that escapes from the vagina has always seemed to me to have but little significancy, as long as the membranes are unruptured ; but after that, I regard it as one of the most certain signs ; it incontestably depends on the circumstance, that the air, by gaining access to the uterine cavity while at a high temperature, under the influence of the uterine contractions, actively promotes the putrefaction of the liquids still remaining within the membranes ; this odour at times is rapidly manifested, and may, in the course of a few hours, become almost insupportable. It would be difficult to confound it with any other odour, such, for example, as that exhaled from an ulcer, or a suppurating surface of any kind ; and up to the present time I have never met with it where the child did not afterwards come dead into the world.

1118. As to the swelling of the hairy scalp, since it is produced by the accumulation of fluids beyond the point of the head, which is strictured more or less violently and for a longer or shorter period by the os uteri, or the strait of the pelvis, it is evident that it will not form, provided the child should be dead previously to the rupture of the membranes ; but, if the child

* Yet Baudelocque was near being deceived by such a symptom : he was on the point of using the perforator, because a sloughing tumour on the scalp gave him this very reason to suppose the fœtus dead. By a sort of miracle of good fortune, he was induced to lay aside the perforator, and resort to the forceps with which he delivered the woman of the child in perfect health with the exception of the gangrenous portion of the scalp.—M.

should not die until after its formation, it might then continue, just as if death had not taken place; I do not speak of the overlapping and movableness of the cranial bones, because they may too easily lead us into error, and also because these two phenomena may depend upon causes far too diverse.

Where it is possible to reach the umbilical cord, we can easily determine whether it continues to pulsate or not; and I cannot readily conceive how this sign could deceive a well-informed practitioner, as to the real state of the child; I know that the vessels of the cord may suspend their pulsations, during each effort made by the womb or by the mother, without the fœtus really running any great risks; but we should not decide upon the child's death simply because we have examined the cord during the presence of a pain, or because we have for a moment felt it to be without pulsation. It is only after having satisfied himself that the pulsation is entirely abolished for several minutes, and equally during the presence and the absence of the pains, below, as well as above the head, either free or compressed, that the accoucheur is at liberty to pronounce without fear upon the state of the fœtus. To be still more certain, if the head had not cleared the superior strait, I cannot see why the hand might not be passed up more or less into the womb, so as to ascertain whether the heart continues to beat, and to touch the umbilical cord nearer its root, or at some point where it should be free from all compression.

1119. If then the combination of all these signs, or the chief of them, were always to be met with where the child is dead, there will rarely be any embarrassment in giving a decision; but they fail so often when it is indispensable to proceed to action, when there is no time for temporizing, that it is easy to imagine how practitioners have been led to the performance of serious and even mortal operations on the mother, although the child was actually dead; and that at other times, the child has been cut to pieces while still full of life. Hitherto, medical men have made only vain efforts to escape from so distressing a position, and may God grant that the method lately proposed by MM. Bermond, Baudelocque, Jr., and Toirac, may not deceive the expectations of its inventors. These three physicians seem to have thought, at the same time, and without each other's knowledge, that by bringing the two extremes of an electric circle, in the womb, in contact with some given part of the child, or merely upon the belly, that its muscular contractions would necessarily be brought into play, provided it were not dead. It is a fact, that both reason and analogy are in favour of this idea; but upon so difficult and serious a subject we ought to wait for a longer experience and not pronounce lightly.

1120. The fœtus is alive, and to keep it so, we have either to enlarge the openings through which it has to pass, or make new

ones: at the commencement of the last century, even when accoucheurs met with a case of pelvis so deformed as to render delivery impossible, they preferred to sacrifice the child rather than perform any operation upon the mother. Some of the boldest of them, like Mauriceau, had immediate recourse to embryotomy, or at least to cephalotomy; while others, as Delamotte, being more timid, and more humane, in appearance, but in reality more barbarous, patiently waited until the child was dead before they would proceed to cut it to pieces. At the present day, inasmuch as symphyseotomy and the Cæsarian operation have been successfully performed a great many times, the operation of embryotomy is not admissible until every thing announces that the fœtus is dead, or that it cannot live.

SECTION 3.

Of Symphyseotomy.

1121. *Historical.* Being persuaded that the articulations and even the bones of the pelvis were capable of being softened during pregnancy, Fernel, S. Pineau, and many other old writers, conceived that it would be useful to favour their softening, in cases of contracted pelvis, and that this might be effected by means of embrocations, cataplasms, and topical or general bathing; founding their opinion upon these vulgar traditions, which are spoken of by Riolan and Paré, and which induce the common people to believe that in many countries there is a practice of breaking the os pubis in young girls as soon as they are born, for the purpose of rendering child-birth more easy for them; upon what Galen, in speaking of the pelvis, says, viz., *non tantum dilatari, sed et secari, tuto possunt; ut internis succurratur*, some modern physicians have supposed that the operation of symphyseotomy must have been conceived of in the remotest antiquity; it is true that Cl. Delacourvée* mentions a deformed woman who died previously to delivery, and in whom, after death, he divided the symphysis pubis for the purpose of enlarging the pelvis; Plenck acted in the same manner in 1766 upon another subject; but it is proper also to state that no one had formerly thought of proposing the performance of this operation in the living subject with the view of facilitating delivery, when Sigault, who was still a medical student, made it the subject of a memoir, which he presented to the Academy of Surgery in 1768.

1122. The idea of symphyseotomy is, therefore, really due to this surgeon; the Academy was hardly willing to hear the first

* *De Nutritione Fœtus in utero paradoxa.* DANTISCI, 1655.

proposal of it, and Louis, who communicated it to Camper, treated it as a ridiculous project, engendered in a young brain that was as yet incapable of any reflection; but not so the celebrated Hollander, who, after performing several experiments upon the dead subject, replied to the secretary of the Academy, that at some future day it might be advantageously resorted to. On his part, Sigault was not disconcerted, and reiterated the same idea in his thesis at the school of Angers in 1773. Four years afterwards he performed his operation in presence of A. Leroy, upon a woman named Supiot, and was so fortunate as to save both the mother and the child. This success gave rise to an extraordinary degree of enthusiasm; the hundred tongues of fame, seemed insufficient to celebrate the glory of the author of so brilliant a discovery. The Faculty of Medicine at Paris thought they could not reward him too highly by passing a solemn decree, and causing a medal to be struck in honour of him; so that this same Sigault, whom the Academy of Surgery would not deign to hear, a few years before, was soon proclaimed the greatest benefactor to humanity, and almost equal to the gods. Such exaggeration as this soon gave rise to a lively opposition amongst the surgeons, and was the signal of a combat, in which a great number of the medical men of different countries felt themselves called on to take a part. The Academy of Medicine warmly supported the opinions of Sigault; the Academy of Surgery, as much perhaps out of spite for not having retained them in its own bosom as from conviction, continued to reject them with no less ardour. Both parties were unjust: the dispute became scandalous; libels were published, personalities were not spared, and being divided into *Symphysians* and *Cæsarians*, as they were then called, the accoucheurs, actuated by inveterate hostility to each other, were not ashamed to keep up this controversy, equally curious and extraordinary, until the commencement of the present century, without coming to an understanding. Plenck, Siebold, A. Leroy, Baudelocque, Saccombe, Giraud, and Ansiaux, descended into the arena, but without perceiving that the question was illy stated. Sigault in fact was wrong to propose symphyseotomy as a substitute for the Cæsarian operation; everybody would have been on his side, had he only proposed it as a new resource, fit to enrich the art, an operation attended with its own peculiar applications, advantages, and dangers, and which at least renders cephalotomy and the Cæsarian operation more rarely indispensable. Weidemann and Desgranges were the first to view it in this light, and by imitating them, Thouret and M. Gardien have at last put an end to these disgusting polemics, which served as an excuse and screen for the jealousy and envious rivalry of all the little spirits of the period, to blacken the fame of a great many most respectable men.

But at the present day, when all the passions awakened on the occasion of this quarrel have become extinct, it is an easy matter to estimate the operation of symphyseotomy at its just value.

1123. *Mechanism.* When the inter-pubal fibro-cartilage is divided either after death or on the living subject, the bones generally separate about one inch, of their own accord, and this separation might, rigorously speaking, be carried artificially to the extent of three inches, without disorganizing the posterior articulations: when the cartilage is divided, the coxal bone somewhat resembles a lever of the first kind; the centre of motion is found at the posterior part of the articular facette of the sacrum; the posterior branch of this lever, very short, and formed by the tuberosity of the ilium, is drawn backwards and towards the median line by the posterior sacro-iliac ligaments; its anterior branch, which is very much bent (*coudée*), separates (from the corresponding pubis), in proportion to its excess of length over the branch, which represents the power; the fore part of each posterior symphysis becomes somewhat open; the fibrous tissue which covers them yields, is elongated, stretched, and detached; the elastic cushion which is behind them becomes relaxed, and the sacrum compressed from behind forwards, tends to escape towards the interior of the pelvis. When the surgeon adds still more to the separation of the pubes by pressing upon the *cristæ* of the ileum, the power is transferred to the anterior branch of the lever, and it is evident, that thenceforth no very violent effort would be required to tear away all the bonds of the posterior articulations. This is the situation particularly, where the displacement of the sacrum in front must cause the increase of the length of the antero-posterior diameter to disappear as fast as it tends to take place. In the empty pelvis and upon pieces of paper this is really the case; but in the living subject, while the pubes are separating, the child's head pushes the sacrum backwards, beyond its natural limits, rather than admits of its advancing into the excavation. Nevertheless, it would, in most women, be dangerous to separate the *ossa pubis* from each other more than one or two inches: we could not go beyond that without lacerating the loose and abundant cellular tissue of the excavation, the anterior sacro-iliac ligaments, and part of the posterior ones, without giving rise to the most violent pain, and causing the most redoubtable inflammation, unless the symphyses should happen to be already very much softened beforehand, under which circumstance it is not likely that symphyseotomy would ever be required. Since you agree, say the antagonists of the operation, on the one hand, that it is not prudent to attempt a greater degree of separation than two inches or two inches and a half; and on the other, that the antero-posterior diameter is never enlarged more than two lines for one inch, four lines for

two inches, and six or eight lines for three inches* of separation, it is manifest that you can depend upon only three or four lines of ampliation of the pelvis: now, is it right that we should perform so serious an operation for the purpose of gaining only three lines, and perhaps not more than two? This argument at first seemed almost unanswerable: then it was said in reply: doubtless we obtain an elongation of only three lines for the antero-posterior diameter, but by engaging in the void space between the separate pubes the parietal protuberance or projecting part of the occiput will abstract at least three or four lines from the diameters of the head, so that we gain at least half an inch. In speaking after this fashion, authors have forgotten that the occiput or the parietal protuberance is commonly found behind the body of the pubis or acetabulum, and not behind the posterior face of the symphysis. But, further, this last disposition, in its turn, gives great advantages in the operation, and I am astonished that the authors have scarcely mentioned it. I mean that, if the antero-posterior diameter is augmented only two or three lines, the oblique ones will be increased by at least six lines; and as the occipito-frontal bregmatic and bi-parietal diameters are not directed from front to rear, but obliquely, it follows, in fact, that the section of the symphysis appears to be less limited in its applicability than has been generally imagined. The researches of M. Desgranges prove that it permits the oblique and transverse diameters of the pelvis to enlarge to the extent of near an inch; that at the inferior strait particularly, it would procure a considerable ampliation, and that upon this subject there is, such is my opinion, a want of some additional experiments.

1124. *Advantages and disadvantages.* The operation of symphyseotomy, therefore, seems to be applicable in all cases where an increase of space to the amount of four, five, or six lines would permit the head to pass; for example, in all cases where the forceps is insufficient, and where, nevertheless, the smallest diameter of the strait exceeds two inches and a half. But as it is seldom possible, in the living subject, to ascertain how far the head is susceptible of reduction under pressure, and whether the strait is two inches and eight lines rather than two inches and a half, it has happened that the accoucheur, finding a difficulty in marking the point where the section of the pubes becomes indispensable, and that where it can no longer suffice, has generally decided in favour of the Cæsarian operation, whenever the absolute necessity of doing something to save the child's life has been ascertained. As to the dangers of the operation, it appears to me difficult to prevent them, where the volume of the head requires a considerable separation of the pubes, and wherever the pelvic articulations

* Boer even asserts that, when carried to the extreme, this separation can never give more than three lines additional to the antero-posterior diameter.

are naturally very little relaxed. Even could we dispense with acting on the hips or thighs, the child nevertheless must pass through, and, whether we extract it with the forceps or by turning, or whether the contractions suffice for its expulsion, nothing seems able to hinder the head, as it passes through the contracted strait, from violently distending the posterior articulations, and even lacerating them if its dimensions exceed those of the circle through which it must traverse.

I am, however, far from thinking, along with Denman, Laverjat, Hunter, Osborn, and Dr. Dewees, that it ought to be rejected in all cases; I merely wish to show that its partisans, in their representations, have singularly lessened its dangers, and exaggerated its advantages.

It is the only means of safety that can be resorted to: 1. Where the head is locked in the excavation, after having passed through a very contracted superior strait; 2. Where the head has cleared the os uteri, and is arrested by the narrowness of the inferior strait; 3. Where the trunk is delivered, the life of the child unquestionable, and it is impossible for the head to get through the natural passages. In these three cases, it is preferable to the Cæsarian operation, even after the death of the woman; and that, because it would be almost impossible to avoid killing the child by attempting to extract it by the abdominal opening.

1125. Further, it offers unquestionable advantages wherever the contraction affects the transverse and oblique diameters; where it exists at the inferior strait; when it depends on *barrure*, an exostosis, any solid tumour situated laterally, or on a protuberance of the acetabulum; the same holds good of locked-head, whether of the species called by Rœderer *paragomphosis*, or whether the head is pinched at the two extremities of its biparietal or occipito-frontal diameter, or in any other way that prevents it from descending, and from being easily pushed upwards; and lastly, whether this locked-head be understood after the manner of Baudelocque, of Madame Lachapelle, or of M. Désormeaux, provided always that the inferior strait be not extremely contracted; it is manifest, further, that if the elongation of the sacro-pubic diameter, produced by the section of the pubes, must be so much the greater in proportion as the contraction of the pelvis is so much the more considerable, as maintained by Giraud and Ansiaux, the very contrary may also happen, as has been well observed by Boer and by Madame Lachapelle.

1126. To perform this operation, it is necessary: 1. That the fœtus shall be living; for, notwithstanding what M. Gardien says, where symphyseotomy is indicated, should the child be dead, we ought to prefer the operation of cephalotomy, which would always suffice in that case; 2. That the presentations shall be natural, and that, as far as possible, we shall not be compelled to extract the

foetus by the feet, because turning too frequently occasions its death ; 3. That the os uteri shall be largely dilated : for otherwise there could be no certainty that the operation is indispensable, and moreover, we might, after performing it, find it impossible to terminate the delivery with the necessary rapidity ; 4. That the woman shall be young enough to obviate all fears in relation to anchylosis of the pelvis.

1127. *Manner of operating.* The patient, being placed upon an operation table, or on the bed, in the same manner as for the application of the forceps, having her thighs and legs slightly flexed, and properly separated, an assistant must hold her shoulders, and two others take charge of her knees, while a fourth stretches the skin of the belly, and a fifth is prepared to hand the operator whatever may be required.

1128. Situated to the right or betwixt the legs of the patient, the surgeon, with a convex and very sharp bistoury, makes an incision, which should commence a little above the symphysis and extend close to the clitoris ; this incision divides the skin, previously shaved, and all the soft parts that compose the mons veneris ; being parallel to the median line, it ought to fall as nearly as possible upon the centre of the articulation ; at its lower part, however, it is well to give it a slight inclination to one side, between the top of the greater and lesser labium, and even to separate one of the roots of the clitoris from the ramus of the pubes, for the purpose of avoiding dangerous lacerations at a later stage of the process. There can be none but very small arteries to tie, unless the internal pudic should be divided by incautiously carrying the incision too far downwards. For the purpose of dividing the cartilage, some have recommended that we should act from below upwards, others from above downwards, and several from behind forwards, or from within outwards, and most writers from before backwards. There are some who have made use of a bistoury, a sort of scalpel *en rondache*, of the pliable knife of Aitken, of a probe-pointed bistoury, or a common bistoury, the point of which M. Gardien recommends to be covered by the point of a nail of the left fore finger, so as to prevent any injury to the internal organs. In such a case every man ought to be allowed to choose the instrument that pleases him best ; for my own part, I think that in this, as in other cases, regard is rather to be paid to the hand that acts than to the shape of the bistoury, and that the only essential qualities of the operating knife are strength and sharpness. The safest way is to cut the symphysis from above downwards, and from the cutaneous surface to the pelvic surface of the symphysis. The incision ought to be extended upwards half an inch, or even a whole inch, along the linea alba. To avoid the risk of wounding the bladder, or urethra, as has happened with some surgeons who went at one stroke quite to the

head of the child, through the bladder and womb, I think it will always suffice to hold the blade of the bistoury at some distance from its point with the left finger and thumb, while we make its cutting edge act with the right hand : with the view of still more certainly avoiding the bladder and urethra, the catheter should be introduced early, or at least previously to commencing the second stage of the operation. By this means the bladder is emptied, and the catheter serves to push the urethra a little to the right, while the incision is inclined slightly to the left side of the sub-pubal ligament. When the ligamentous matter is almost divided, the precautions are to be redoubled ; the cutting should now be done almost wholly by touches with the point of the knife, and it is to be laid aside as soon as we find no more resisting and elastic material to divide.

1129. Frightened with the imaginary disorders which might be produced by the access of the air into the articulation, Alphonse Leroy advised that the operation should be divided into two stages : for that end M. Lescure, his pupil, thinks that an incision of nine or ten lines should first be made through the skin, then, after having divided one-third of the cartilage with extreme gentleness, that we should return and prolong the section of the ligaments as far as the clitoris, and afterwards proceed to divide the remainder of the cartilage, “ without minding the blood that escapes from the small external pudic vessels ; this section is performed,” says he, “ very slowly, and by carefully feeling the cartilage.”

Others have supposed they could more certainly attain the same end, by dividing the skin only above and below the symphysis, or, even only to the extent of a few lines opposite its middle portion, which would surely render the section of the ligament very difficult ; but at the present day these ill-founded fears are dismissed : it is universally known that the accidents that too often follow the operation of symphyseotomy are unconnected with the action of the air upon the cartilage ; and further, that such modifications in the mode of conducting the operation would in no wise prevent it.

1130. Previously to commencing it is important to make sure of the spot occupied by the articulation ; for when the pelvis is deformed, it is not uncommon to find it deviated so far to one side that the operator has on more than one occasion fallen on the body of the bone, instead of uncovering the cartilage itself.

Should it so happen that the symphysis is found ossified, as in the pelvis mentioned by Wiedemann and Lauverjat, and as Boer and Madame Lachapelle inform us is often the case, there would be so small a chance of obtaining even a tolerably large opening, that instead of sawing the articulation, as was done by Siebold, I should prefer to have recourse to the Cæsarian operation. By applying the saw beyond the symphysis, upon the very body of

the bone, according to the counsel of M. Desgranges, the operation would not be rendered either more or less dangerous; for the difficulty exists behind, in the sacro-iliac articulations, and not in front.

1131. Immediately subsequent to the division of the cartilage, the posterior branch of the bent lever, formed by the coxal bone, being acted on by the elasticity of the posterior sacro-iliac ligaments, occasions a separation of from six to twelve lines between the pubes. This separation must necessarily vary, according to the degree of contraction of the pelvis, and the rigidity or softness of the symphyses: if it is sometimes effected in equal proportions by both of the bones, there must also be cases where one is much more concerned in it than the other. Be this as it may, I find it difficult to understand how it can go, spontaneously, to such an extent as to prove dangerous, or that it is worth while to restrain it by securing the hips previously to the conclusion of the operation. On the contrary, to carry it to a sufficient extent, it is almost always requisite slowly and moderately to press the hips from within outwards, and from before backwards, or carefully to separate the woman's thighs.

1132. Unhappily, when the operation is terminated, the delivery is still far off. If the contractions are energetic and well sustained, the delivery is entrusted to the natural powers, to which also it would doubtless be better to refer the care of separating the divided symphysis to the required extent; but if the womb does not react, if the labour grows languid, or any circumstance arises demanding the prompt extraction of the fœtus, we are obliged to apply the forceps, or turn the child, and that conformably to the principles that have already been laid down; remembering, further, that turning causes the child to incur the greatest risks, and that it was for the preservation of its life that the mother was subject to the section of the pubis.

I should so greatly fear to bring down the feet in such a case, that unless they had originally presented, I would without hesitation give the ergot to excite the uterine contractions, and would attempt the employment of the forceps, even should the head, still engaged in the superior strait, be found to be situated transversely. During this part of the operation, it would probably be necessary to support the hips or whole pelvis, either with the hands or a suitable bandage, so as to prevent the articulations from being too much lacerated by the eccentric pressure of the fœtal head or the efforts of the accoucheur.

1133. *Dressing.* When the delivery is complete the woman is to be cleansed; the pubes are brought into contact with each other; some lint, spread with cerate, and some compresses are to be placed over the womb; a body bandage passed round the pelvis keeps every thing in place, and should be sufficiently tight

to prevent, at least to a certain extent, a new separation of the bones from taking place; the patient being now put to bed, ought to lie on her back, and be kept in a state of the most perfect rest; her thighs especially ought not to move for six weeks or two months, a period of time which is indispensably necessary for the consolidation of the symphyses; she is also to be kept upon the regimen proper in serious operations, and if any accidents make their appearance they must be vigorously combated.

The discharge of the lochiæ must be carefully attended to, and if they threaten to disappear too soon, emollient or detergent injections should be thrown into the vagina, and the woman should be advised, if she can, to suckle the child, and care must be taken to preserve the lips of the wound in constant contact. When the term of cure approaches, motion, and particularly walking, should not be allowed except with great reserve. Should there still remain any mobility and pain in the pelvis, recourse must again be had to rest for a longer or shorter period, and it often happens that walking and standing cannot be permitted without danger for three or four months. Doubtless nothing can be more desirable than the consolidation of the divided symphysis; but there have been women in whom it could not be obtained, and who were notwithstanding able to walk, stand, and leap, without sensible inconvenience, which is to be explained upon the supposition that the posterior symphyses had acquired a great degree of firmness. MM. Mansuy and Dubois have each related a case of this sort. A. Leroy and M. Lescure even go so far as to say that it ought to be promoted by omitting any bandage round the pelvis; they say, and perhaps they are not wholly wrong, that the space between the symphysis fills with a cellulo-fibrous tissue, which does not prevent the articulation from being firm, and also allows the woman to bear children subsequently with much greater facility.

1134. *Results.* Upon the whole, when we consider that out of forty-three women who have undergone the operation of symphyseotomy, fourteen died; that several remained crippled for life, particularly the two spoken of by Madame Lachapelle, and who were operated on at the *Maternité*; that in some of them the operation was not indispensably necessary, since, as we find in Baudelocque's work, that they were afterwards delivered without assistance or difficulty; that most frequently the child has not been saved, and that, in fact, it must in a majority of cases perish under the operation of turning or the forceps, which we are almost always obliged to try; lastly, as observed by Lauverjat, that in eighteen operations, twenty-one individuals, mothers or children, perished; that in two cases it was found necessary to have recourse to the Cæsarian operation; that five were followed by incontinence of urine, and one by claudication; that in the thirty-four cases mentioned by Baudelocque, only eleven children were

saved ; when we consider, I say, all these dangers, and compare them with the advantages derived from it in the most successful cases, it is difficult not to concur with M. Désormeaux in regarding the section of the symphyses as being in fact scarcely less serious than the Cæsarian operation, and that its employment ought to be restricted within pretty narrow limits.

1135. *Catolica's operation.* If I understand correctly what was told me by Professor Vulpès, it would appear that Dr. Catolica, of Naples, had substituted another operation for that of symphyseotomy, which, properly speaking, is but a modification of the one already proposed by M. Desgranges of Lyons. Instead of dividing the cartilage, he proposes that the body and ramus of the pubes on each side should be divided between the two oval foramina, as was recommended by Aitken. In this way, the sacro-iliac symphyses remain uninjured ; no risk of wounding the bladder or urethra is incurred ; the cellular tissue of the pelvis is scarcely stretched, and the consolidation is easily obtained ; there is no fear of abscess, caries, fistulæ, claudication nor peritonitis, and a considerable ampliation of the sacro-pubic diameter is obtained. I am not sufficiently acquainted with the reasons of the author to enable me to combat or approve the operation, and until I shall have become more fully informed, shall content me with the little I have now said concerning it.

SECTION 4.

Of the Cæsarian Operation, (Hysterotomy, Hysterotomotocia, Cæsarian Delivery, Gastro-Hysterotomy.)

The denomination of Cæsarian section is given to an opening made into the belly and womb for the purpose of extracting the fœtus when it cannot be delivered through the natural passages ; since the time of Simon its application has been further extended to the incision or incisions which it is sometimes necessary to make in the cervix of the uterus, with the view of facilitating the passage of the head through it.

1136. *Historical.* Being lost, as it were, in the night of time, the origin of this operation has not as yet been precisely ascertained by any one. In the fabulous ages, it was said that a fœtus, the son of Jupiter, was extracted from the belly of Semele by Mercury. The Romans made the same statement concerning Esculapius, who was extracted from the belly of his mother by Apollo, after she had been already placed on the funeral pile destined to consume her. Virgil also says that Lycus came into the world in the same manner. These vague traditions, a passage in Pliny, and certain Roman laws, induce a belief that the Cæsarian opera-

tion must have been employed in the most remote ages. M. Mansfield, in a work, an extract of which is contained in the *Bulletin des Sciences Médicales*, attempts to prove that it was practised even by the Jews. It is said in the Talmud and the Mischajoth that a child born by the section of the belly has not the rights of primogeniture. Jaschi has described it in his commentary on the *Nidda*, and says that women who have undergone it are not compelled to perform the forty-days purification. There is, however, no certain proof that it was performed upon a living woman anteriorly to the year 1520, unless we admit as authentic the case of the lady at Craon, who, according to the statement of Goulin, was subjected to the section of the belly in 1424, and, as well as her child, survived the operation. The ancient Greek and Latin physicians make no mention of it whatever. Guy de Chauliac, who seems to have first described it, founding his opinion upon the following passage of Pliny, (*Auspiciatus, enectâ parente, gignuntur, sicut Scipio Africanus prior natus, primusque Cæsus, Cæso matris utero, dictus; qua de causâ, Cæsones appellati. Simili modo natus est Manlius qui Carthaginem cum exercitu intravit*), believes that it took its name from Julius Cæsar; others, on the contrary, think that the general and his family took their name from the operation. Bayle remarks that Aurelia, the mother of Cæsar, was still living when he went to Britain, and consequently that the story related by Pliny ought to be rejected as fabulous; the researches of Weidemann and those of Sprengel having given no satisfactory solution of this problem, we are obliged to confess that the etymology of the Cæsar operation is no better known than its origin.

1137. Rousset was the first author who dared to maintain that it may and ought to be had recourse to in the living subject; after having cited various experiments and numerous analogies, he mentions seven women who had been subjected to the Cæsar operation with complete success; but can we rely upon the authenticity of the case of the woman named Godon, who was operated upon seven times; upon that spoken of by the surgeons Lenoir and Lebrun, who operated upon the same subject three times; the recital of Alibax, of Sens, of Colot, or the story of the woman who had a long scar upon the right side of the belly, and who said she had a child extracted through the part seven years before? Ought we to receive, according to the very letter, what G. Bauhin says of the person called Alipaschie of Siergershensen in Germany, who was operated upon by J. Nufer, a spayer of cattle, after she was given over by several midwives, and who recovered so happily, that several years afterwards she was delivered, without danger, of two other children? What are we to think of the other fact mentioned by Paré and Schenck relative to Nicola Berenger? How happened it that this woman was delivered two years afterwards

of a girl, and subsequently of a boy, if there was any necessity for her to undergo the Cæsarian operation? The same may be said of the case of Elizabeth Turgois, who subsequently gave birth to four children, by the natural passages, according to the report of the same Bauhin. Lastly, it is certain that of the sixty odd cases related by Rousset, Bauhin and Simon, only a very small number are quite conclusive, and that Paré, Guillemeau, Marchant, Mauriceau, and all persons who were unwilling to be convinced except by well-established facts, were possessed of excellent reasons for combating the assertions of Rousset.

1138. Be this as it may, according to Baudelocque himself, the Cæsarian operation has been successfully performed twenty-four times from 1750 up to the commencement of the present century, and without counting the two cases of Lauverjat, which are unquestionable, it has been since performed at Nantes twice upon the same woman, by Bacqua, once by M. Lemaistre of Aix, once by M. Dariste at Martinique, once by Vonderfuhr, in 1823, at Dahlen, once by the physicians of the Hospital of Florence, on the 18th of May, 1827, twice by Schenck, once by Bulk, once by Græfe, once by Leuch, once by Buren, another time, recently, in one of the colonies; so that we cannot refuse to believe that at least some women may possibly be saved by means of the Cæsarian operation.*

1139. The danger attending it cannot, however, be denied. Boerhaave and Boer were doubtless wrong in stating, that scarcely one successful case could be found in fourteen operations; but it is at least certain that it has been performed four times within the last twenty years at the Paris *Maternité*, and that the women all perished; that out of seventy-three cases cited by Baudelocque, forty-two were followed by death; that of one hundred and six cases reported by Sprengel, forty-five were unsuccessful, and that of the two hundred and thirty-one operations mentioned by Kelly and Hull, one hundred and twenty three were incompetent to save the lives of the women; let us add that all the successful cases have certainly been published, and that there is a great number of them whose authenticity may justly be called in question; whereas, according to all appearances, the same thing has not happened as to all the unsuccessful cases, of which perhaps the greater proportion may have been passed over in silence. It may be stated, therefore, that, up to the present day, the Cæsarian operation has proved fatal in at least one out of two cases, and that Tennon was mis-

* Let us add that it has been twice performed by Professor Gibson on M. R. in Philadelphia, saving, in the first instance, a daughter, and, in the second, a son, both of whom, as well as the mother, are still in good health. It has also been recently performed in Germany, with perfect success, for the fourth time, on the same woman, by Michælis. For an account of Dr. Gibson's operations, *vide* the Amer. Journal of the Med. and Phys. Sciences.—M.

taken in asserting that since the time of Bauhin, it has been performed at the Hotel Dieu on seventy women, who recovered. By the report of J. Burns and S. Cooper it appears that not a single well-attested case of its successful performance has occurred in Great Britain, although the number of operations amounts to fifteen or twenty.

I think these details will suffice to exhibit this operation to young practitioners in all its importance, and to prevent them from resorting to it in any case save where the necessity is absolute.

Nevertheless, it is difficult to conceive *a priori* that it is of so redoubtable a character. The wound which it is necessary to make in the abdomen is indeed very large, but the parts divided are not very delicate; there are no arteries, no large nerves, and nothing of any great importance to guard against; the peritoneum is wounded, but the digestive organs may be easily avoided; besides, how often have the largest and most complicated eventrations, and penetrating wounds of all kinds been seen which yet gave rise to no very serious consequences, and admitted of the recovery of the patients; is not the serous membrane of the belly laid open every day, without our being alarmed about it, in subjects affected with strangulated hernia? Would the wound of the uterus alone prove dangerous? but every thing in this organ indicates that it possesses but a slight degree of irritability, a slight tendency to take on inflammatory action, and has the most favourable conditions for a sure and prompt cicatrization. Are there not several cases of women who underwent the Cæsarion operation successfully, subsequent to rupture of the womb, and particularly the one recently made public by Doctor Frank? The wound, which is at first very large, is soon reduced to one-fifth or one-sixth of its original size, and when the organ is free to contract, the hemorrhage ceases too quickly for any alarm to be felt in relation to it. Lastly, is it not possible by proper precautions to prevent the liquor of the amnios, the blood and other fluids from being poured out into the peritoneum during and immediately after the operation?

1140. It would seem then that it is not so much upon itself, as upon the peculiar state of the woman at the time, that the serious nature of the Cæsarion operation depends. Consequently, I can scarcely refuse to admit the idea, that if we were to act as soon as the indication becomes positive, without waiting until the person becomes exhausted with vain efforts, the uterus in a state of inertia or on the point of becoming inflamed, if not already so; until peritonitis or enteritis has become imminent, or existent; or lastly, until the patient's life is in danger—the Cæsarion operation would not be near so often fatal, as, unfortunately, it has hitherto been found to be.

In support of this view of the subject, I hope I may be permitted

to allege a sentiment of Dr. Hull, who attributes the unfortunate results obtained by his countrymen to the circumstance that they never operate, in England, except in desperate cases, whereas upon the continent they are willing to have recourse to it at an early period.

1141. When the smallest diameter of the pelvis is less than fifteen lines, be the fœtus dead or alive, the operation of hysterotomy is the only chance of safety that we can propose to the woman. When this diameter amounts to from eighteen lines to two inches and a quarter, it is equally indispensable, where we do not wish to act upon the child; but in this case, the child must be alive, and further, it remains for us to decide whether it is better to follow the English doctrine and destroy the fœtus, than to expose the mother to the danger of losing her life. Lastly, it may happen that we shall be compelled to resort to it, even although there should be two inches and a half or two inches and three-quarters at the smallest passage, provided the forceps, turning, or the section of the pubes shall have been deemed useless, or have been tried in vain.

1142. Not only ought the Cæsarian operation to be performed upon the living subject, but it is also a rule of practice to subject those to it who perish after the seventh month of pregnancy without being delivered.

The child does not always cease to live at the same moment with its mother, although most frequently it dies first. We might even believe, admitting as true what has been written upon the subject, that life may be maintained in the ovum more than twelve, twenty-four, or even forty-eight hours. The Princess of Schwartzemberg, who died at Paris in consequence of a burn, could not be opened until the next day, and the fœtus was, notwithstanding, found to be living. Another woman, mentioned by M. Gardien, was not operated on until after forty-eight hours had elapsed, and the child was found to be still alive. Flajani, Veslingius and several other authors relate cases of a similar character; but may we give credit to the assertions of Cangiamila, when we find him affirming in his *Sacred Embryology* that in the space of twenty-four years, twenty-one children were saved in this manner at Montereali, thirteen at Girgenti, and that the Cæsarian operation was performed under these circumstances twenty times at Syracuse in the course of eighteen months?

1143. Be this as it may, the Roman law, *lex regia*,* which is referred to Numa Pompilius, ordered the physicians of that period to open the bodies of all women who died pregnant, with the view of preserving citizens for the state. To fortify this ancient usage, without compromising the lives of women who might be

* Digest., lib. IX. tit. viii. L. 2, et lib. I. tit. v. &c.

only in a state of apparent death, the Senate of Venice issued a decree in 1608 and 1721, which ordered severe penalties upon those members of the profession who should operate upon a person supposed to be dead without the same degree of care as if she were actually living. In 1749, the King of Sicily made another law, by which he inflicted the penalty of death upon physicians who should omit to perform the Cæsarian operation upon women who should have died in the last months of pregnancy.

It is very useless, no doubt, to think of preserving the life of a fœtus previously to the end of the eighth month; but in Catholic countries there is a desire at least to baptize them, and that the operation should be performed, in fact, if the woman has passed through one half of the period of pregnancy.

1144. As to the necessity of acting, immediately subsequent to the death of the mother, with the same precautions as if the woman were known to be living, no one will entertain a doubt—in view of the difficulty of ascertaining with certainty that life is irrevocably extinct, and of the promptitude with which we ought to act under such circumstances. Precipitation might really produce a decease which might possibly be otherwise avoided, and the time required to establish the certainty of the woman's death would more than suffice to ensure the loss of the child, which, in fact, is never extracted alive, excepting in a few cases, appertaining somewhat to the miraculous, unless the extraction be effected during the first moments that succeed the death of the mother.

Van Swieten and Baudelocque mention three cases of women, supposed to be dead, on whom the Cæsarian operation was about to be performed, when they recovered from their lethargic state. Peu relates an instance far more calculated to excite alarm: he commenced his incision, when the woman gave a shudder, accompanied with grinding of the teeth and a movement of the lips. Rigaudeau has related another one not less remarkable: he was sent for, two leagues from Douai, to see a woman whose labour had excited great uneasiness; when he arrived she was believed to have been dead for two hours. Instead of opening the abdomen without any examination he explored the genital organs, found the pelvis well formed, and proceeded to turn and deliver the child by the feet, which was born in a state of apparent death, but which with great exertion was brought to life in about two hours. The limbs of the mother preserving their suppleness, he forbid them to bury her until the abdomen should have turned green; after a few hours this woman recovered so completely from her insensibility, that she came herself, four years afterwards, to inform Rigaudeau that she was not dead!

Thus, when called to a woman who has lately expired, the first thing to be done is to ascertain the state of the pelvic passages, and whenever they are sufficiently capacious, an attempt should

be made to extract the child through the natural passages. In the second place, if hysterotomy is found to be indispensable, it is to be performed according to the same rules, and with as great care as if the woman were living. By acting in this manner, whatever may chance to occur, we have nothing to reproach ourselves with, and nobody is liable to be blamed.

1145. When the Cæsarian operation used to be performed only upon the dead subject, the incision was made upon the left side of the abdomen: "*Let the woman be opened with a razor along the left side,*" says Guy de Chauliac, "*inasmuch as that part is freer on account of the liver.*" But since it has been attempted upon the living female, it has been subjected to rules formed on a better foundation. Among the various methods proposed by different accoucheurs, there are five which have attracted special attention: in one the incision is made upon the median line, and parallel to the axis of the body; in the second, the cut is made outside of the rectus muscle; in the third, the abdominal parietes are divided transversely, upon one of the sides; in the fourth, the wound is made immediately above the Fallopian ligament and parallel to that fibrous band; and lastly, the fifth is made at the level of the crista of the ilium.

1146. *Mauriceau's method.* Solayrès, Hankel, Deleurye, &c., are wrong in attributing the idea of cutting down upon the median line to Platner, to Guérin, or to Varoquier. Mauriceau had expressed himself in the following terms: "Most persons direct the incision to be made on the left side of the belly, but the opening will be better in the middle, between the recti muscles, for in that part there is nothing but the integuments and muscles to be cut." This proceeding, which is preferred by Baudelocque, and now generally followed in France, England, and Germany, permits us to avoid the muscles, and to act only upon the linea alba; only a slight degree of pain is produced; no artery can be wounded, and moreover, the uterus is incised parallel to its principal fibres. But it has also been said that this method exposes us to the hazard of inflicting a wound upon the bladder, and that the discharge of the fluids, whether during or after the operation, cannot be effected without difficulty; the wound occupying none but fibrous tissues, is slow in healing, and the uterus being laid open throughout almost the whole extent of its anterior wall, instead of tending to approximate the lips of the division, rather separates them by its contraction.

1147. *Method of the ancients.* In operating upon the side of the abdomen, the ancient accoucheurs generally chose the left side, and made sometimes a straight, sometimes a slightly oblique incision, or one of a crescent shape, but always immediately outside of the rectus muscle. According to the statements of the physicians who employed it, this method has over the preceding

one the advantage of avoiding all danger of wounding the bladder, of permitting the cicatrization to be easily effected, and of rendering the issue of matters that must escape from the wound far more easy. As the womb almost always undergoes a twist upon its axis, inclining to the right or left, it has been supposed that by making the incision along the median line, it would fall nearer to its left edge than to the middle of its anterior region; this also is one of the considerations from which it has been recommended that the operation should be performed upon the side towards which the uterus has naturally deviated. Even admitting all these advantages to be real, they would, nevertheless, be compensated, it seems to me, by the risk of wounding the epigastric artery or some of its branches; of having a wound, the lips of which it would be almost impossible to keep in contact, on account of the retraction of the oblique and transversalis muscles, and by the impossibility of obviating the absence of parallelism in the two wounds of the abdomen and womb.

1148. *Method of Lauverjat.* To avoid the disadvantages connected with these two methods, Lauverjat, who at first admitted the great superiority of hysterotomy at the median line, attempted to methodize a procedure which had already been resorted to by some practitioners, and recommended a transverse incision about five inches in length, between the rectus muscle and the spinal column, somewhat below the level of the third false rib, and more or less so, according as the fundus of the womb is more or less remote from it. By proceeding in this manner the fibres of the transverse muscle are rather parted than divided; the epigastric and lumbar arteries are avoided; we fall upon the fundus of the womb, whose cavity forms a sort of funnel, which renders the discharge of the lochia very easy, both by the vagina and hypogastrium; the parallelism is easily maintained; the suture is not required; mere position suffices to keep the wound in exact opposition; lastly, the external angle of the cut occupying a low situation, extravasations into the abdomen are incomparably less to be dreaded than in the other methods. But it may be objected that the fibres of the external and internal oblique muscles are necessarily divided; that the least effort must force the viscera out; that the womb being divided at its fundus, where its vessels are largest, soon removes to a considerable distance from the external opening, and that its fibres, by contracting, must rather hinder than promote the approximation of the edges of the inner incision; so that, notwithstanding the two successful cases of Lauverjat, and the preference apparently given to him by Sabatier and M. Gardien, this method is evidently scarcely less dangerous than the two former ones.

1149. *Method of M. Ritgen.* Dreading above all things the wounding of the peritoneum and of the *body* of the uterus, Ritgen

has of late recommended that the attachment of the broad muscles of the abdomen should be divided above the crista of the ilium; that the peritoneum should be detached as far as the superior strait, and that the neck of the womb should be divided to a sufficient extent to admit of the extraction of the child. In the first place, I cannot perceive how it would be possible to incise the apex of the womb without cutting the serous membrane with which it is enveloped; then, the difficulties inherent in this proceeding, added to the detachment, which would be produced in the iliac fossa, do not appear to me to be of a nature to render the operation at all less serious than those which have been mentioned; besides, as far as I know, at least, the operation is as yet only a project, and no one has put it in practice in the living woman.

1150. *Method of M. Baudelocque, Jun.* Attributing the principal dangers of the Cæsarian operation to the double wound of the peritoneum; and further, regarding wounds of the uterus as almost essentially mortal in their character, M. Baudelocque has proposed a new method, which in both these respects appears to him to be infinitely preferable to all others, and which in fact differs from them very considerably.

The incision is commenced near the spine of the pubis, and extends, parallel to the Poupart's ligament, beyond the anterior-superior spine of the ilium. He selects the left side, on account of the inclination of the cervix, when the womb is oblique to the right, and the right side where there is a left lateral obliquity. After having divided the abdominal parietes without touching the epigastric artery, he pushes away the peritoneum from the iliac fossa quite down into the excavation, and detaches it from the upper part of the vagina which he opens through this opening, which ought to be sufficiently free, the finger is conducted into the os uteri, which is now to be drawn up towards the wound in the abdomen, while the fundus is at the same time pressed in an opposite direction, so as to make it turn over more readily. When the operator has succeeded in bringing the orifice of the womb opposite to the opening made in the abdominal parietes, the delivery is entrusted to the uterine contractions, or provided it should be absolutely necessary, the orifice might be dilated with the fingers, and the foetus extracted either with the hand or the forceps.

1151. The idea of this method, which the author denominates elytrotomy, is certainly ingenious; he has performed on the dead subject, both pregnant and not pregnant, a number of experiments, which have confirmed him in the favourable opinion he had previously formed concerning it, and which have sufficed to induce some practitioners to suspend their judgment in relation to its value. Nevertheless, I can scarcely believe that it will be

found practicable in a majority of cases, or that the laceration of the vagina in addition to the disturbance necessarily occasioned in the iliac fossa or in the excavation would be less redoubtable than the simple and methodical incision of the peritoneum and womb, such as may be performed in ordinary hysterotomy. I may further add, that M. Baudelocque himself has very recently been obliged to have recourse to the Cæsarian operation, properly so called, after having tried the operation of elytrotomy in the case of a woman who had long been under his supervision, and in which he was assisted by M. Hervez de Chegoin. I am aware that one single fact does not warrant us in drawing rigid conclusions; but this, which is the only one we have in regard to the living subject, seems to me to lend great force to the distrust of the author's notions derived, *a priori*, from reasoning.

1152. *Method of Dr. Physick.* Another mode of operating, which is somewhat like that of Professor Ritgen, and also is not very different from that of M. Baudelocque appears to have been proposed, almost at the same time, by Dr. Physick. After having remarked that in pregnant women, the peritoneum is easy to separate from the bladder and parts about the os uteri, this surgeon conceived that by making a horizontal incision immediately above the pubis, the os uteri might be reached and opened without interesting the peritoneum: but notwithstanding what Dr. Horner may say concerning it, this operation is but little worthy of its inventor, and does not deserve the trouble of being discussed.

1153. *Previously to commencing the operation*, it is proper to soothe the mind of the patient by inspiring her with the greatest possible confidence; a good condition of the general strength, and of the womb in particular; an obtuse, rather than a lively sensibility; a great degree of resignation, such as is pretty often observed in country-people, are most of all to be desired; if the child is incurring any risks we should make haste; otherwise, bleeding, baths, purgatives or any other proper means may be sometimes made use of; and lastly, the conduct here in relation to the preparations, is the same as in all the great operations.

If the bag of waters is not ruptured, ought it to be torn, as Planchon advises, previously to making the incision into the womb, or must it be let alone, as most other authors advise? By emptying the membranes the escape of the liquor amnii into the peritoneum is prevented, and there is less reason for fear as regards hemorrhage and inertia of the womb. But these are not the most to be dreaded of all the occurrences that may take place during the operation; we are much more frequently embarrassed by the contraction of the womb than by its inertia. When the ovum is whole, the child can be much more easily extracted; the wound in the uterus, at first more extensive, is however reduced at last to much smaller dimensions; lastly, there is less irritation excited

in the womb, and upon a careful consideration of all the circumstances, I believe, in common with M. Désormeaux, that it is better to preserve the membranes whole.

We should never omit to empty the *rectum*, and *bladder*, especially if it be intended to follow the method of Mauriceau. The *apparatus* consists of a convex bistoury, a straight probe-pointed bistoury, pincers, scissors, suture-needles, thread, quill-barrels, adhesive strips, lint in rolls and in pledgets, of pieces of linen spread with cerate, of compresses both oblong and square, a bandage for the body, small and large sponges, a syringe, canulas of gum-elastic, to be used in case it should be necessary to make any injections, water, both cold, and warm, and vinegar; wine and cologne-water are also necessary.

If possible, the patient should *be laid* on the bed that she is to occupy during the first few days after the operation; her position ought to be an easy one. She should be placed on her back, with the legs and thighs very slightly bent, and assistants are charged to watch against any sudden movements which the pain might compel her to execute; two intelligent assistants must apply their hands upon the sides and fundus of the womb, so as to circumscribe it very exactly, in order that no organ may happen to slip betwixt its surface and the abdominal parietes, and so that it may compose with the latter parts but one single mass. For this purpose the naked hands seem to me less suitable than they would be if applied upon pieces of broad flat sponge, as advised by Dr. Hédénus.

1154. With the convex bistoury the surgeon makes an *incision through the integuments*, from near the umbilicus towards the pubis, in length from five to six inches, without its being necessary, or always even possible, to pinch up a large fold of them, as advised by Levret. The subcutaneous layer, the aponeurosis and the muscular fibres, as well as the cellular tissue, provided we do not operate upon the median line, are successively divided in the same manner and to the same extent. This incision ought not to be carried too near to the pubis, on account of the bladder, and because the abdominal parietes are generally very thick in that situation. It would be better to extend it above the umbilicus, taking care to pass to the left of it, so as to avoid the umbilical vein, and more particularly, the anastomosis which may exist between it and the epigastric vein, an anastomosis which has latterly been noticed by M. Mesniere, Clement, and Martin.

After having *opened the peritoneum* so as to admit of the introduction of the left fore finger, to serve as a conductor for the instrument, the wound in that membrane is to be enlarged by means of the probe-pointed bistoury, to the same extent as the wound in the skin.

The *womb* is now *exposed*; it is to be incised layer by layer, and

slowly, until we reach the surface of the ovum ; then, in order to retain for the cervix as much of its length as possible, the assistants are told gently to press the fundus of the uterus downwards and make it turn somewhat in front ; we might, indeed, like Dr. Kluge, hook the lower angle of the wound of that organ with the finger, so as to favour such a movement, which by affording a facility for extending the section very far upwards, permits us to guard the cervix. In order to avoid the risk of wounding the vessels of the placenta, it is better to use the probe-pointed bistoury to finish the incision, than to have recourse to the grooved director to guard the bistoury with. Further, I can conceive no objection to letting the point of the finger detach the placenta and membranes to a certain extent.

This is the moment, and not before the commencement of the operation, that it would be perhaps well to follow the advice of Planchon, and rupture the membranes by passing the finger up the vagina, either with the fingers alone, or with the instrument of Siebold, as is generally done in Germany ; supposing, which appears to me preferable, that the membranes should be pierced from the incision, it will be necessary for the assistants to redouble their care to prevent the parietes of the abdomen from abandoning the womb ; in this way the effusion of the waters into the cavity of the peritoneum will be obviated, and the tendency of the viscera to escape outwards will remain ineffectual.

1155. The extraction of the child ought to take place without delay ; when it presents by the head or by the breech it is drawn away in that position, and to favour its escape, the assistants are told to press gently upon the sides of the womb through the parietes of the abdomen ; if it be situated otherwise, the feet must be got hold of, and the extraction performed with the same precautions as in delivery by the natural passages, special care being taken not to bruise or stretch the lips of the wound in the uterus.

1156. As soon as the fœtus is withdrawn, the practice recommended by Planchon might be adopted, viz., by means of a sound the cord might be repassed through the wound, for the purpose of removing the after-birth through the vagina, but no beneficial effects would be ultimately obtained by it, and the celerity of the operation would be sensibly lessened ; after all, the retraction of the womb, which would most generally render this operation impossible, soon forces the placenta to engage in the wound, and thus points out the route we should select in extracting it. In order that it may present less volume and less resistance, one of its edges even may be taken hold of, if possible, rather than pull it away by the cord only. As to the membranes, they must be carefully twisted into a rope as in a natural delivery, to prevent any of them from remaining in the uterus. Should any blood have been lost and formed into clots, they ought to be removed with

the hand. It would be well, moreover, to cleanse all the parts by means of an injection of warm water; but I do not think that for the purpose of keeping the os uteri open, it is of any advantage to place in it the tent recommended by Baudelocque, nor the *cierge pertuisé* of Ruleau, nor the tent of Rousset, nor the sound of M. Tarbè, nor any species of canula whatever; these means would not prevent the os uteri from closing, and would augment the irritation to no purpose. The finger introduced from time to time suffices to keep it free enough, should it cease to give issue to the matters, which, after all, nothing can prevent from passing wholly or partly out of the wound.

1157. The operation being terminated, we must next think of putting a stop to the flow of blood. In the lateral operation, and especially in that of Lauverjat, several arteries may have been divided; they should now be tied, provided they should not have been secured during the progress of the operation. During the operation, the principal orifices of the uterine arteries have been closed by the fingers of the assistants; there never can arise any question about obliterating them with the ligature; but it has been recommended to cauterize them with vitriol, and generally, to trust them to the contraction of the womb, which is to be solicited, provided it be slow in taking place; by irritating the cavity of the organ or the lips of the wound with the fingers, or linen moistened with vinegar and water, after a few minutes the length of the incision in the womb is reduced to from one to two inches, and thenceforth hemorrhage of any kind becomes impossible.

1158. In England, in Germany, and also in France, the wound in the abdomen is generally closed by the interrupted or twisted suture, because, it is said, that is the only means of keeping the lips in contact, and of preventing hernia of the viscera. Sabatier, however, thinks it ought to be dispensed with, and says that unless the whole thickness of the abdominal parietes be included in each stitch, which would be dangerous, the adhesive strips will do as much as the sutures, without compromising, in the same manner, the safety of the patient. But notwithstanding the reasons urged by that learned author, it seems to me to be preferable to have recourse to the suture, even where Lauverjat's operation has been adopted. In all cases the lower corner of the wound should be left free to allow the matter to escape. Besides, the sutures do not prevent the application of adhesive strips over their intervals, nor the favourable action of an uniting bandage, and a proper position.

The wound is then covered with a piece of linen, perforated, or with strips spread with cerate; two long and broad compresses are placed on the sides; some pledgets of soft lint, common compresses, and a body-bandage well applied, will complete the dressing.

Previously to leaving the woman, the linens soiled during the operation should be removed; she is to be placed in the middle of her bed, taking care to move her as little as possible, and we should endeavour to place her so that her muscles may be all in a state of relaxation.

1159. Some antispasmodic potions, slightly opiated, to calm the nervous agitation; some precautions to ensure the discharge of the lochia by the vagina instead of their escaping into the peritoneum; diluting drinks, bleeding and leeching as soon as any symptoms of inflammatory action become manifest, and the greatest repose, both of mind and body, are all that the surgeon can recommend to the patient to obviate the dangers which threaten her.

SECTION 5.

Vaginal-Cæsarian Operation.

1160. According to the reports of authors there are a great number of causes which may necessitate the performance of the vaginal-Cæsarian operation: an obliteration, with fibro-cartilaginous induration of the os uteri, as in the case related by Simson, and also in that other case spoken of by Van Swieten; violent convulsions which endanger the life of the woman while the orifice is too tense, and still insufficiently dilated to admit of the introduction of the hand, as is observed in the cases by Dubosq and Lambron; an extreme obliquity of the orifice backwards, while the head of the child at the same time forces down into the excavation, and even as low as the vulva, the anterior portion of the womb, which it extends, renders thin, and would at last rupture, provided an incision were not soon made, as was done by Lauverjat—such as the occurrences which have most frequently rendered it necessary: it may also become useful where the uterus, having escaped from the pelvis during pregnancy, has never been reduced, and where its orifice cannot be dilated by means of the fingers, although there may be danger in delaying the delivery, as in the examples cited by M. Thenance, Jacomet, and a surgeon at Vaux mentioned by M. Bodin; but it has been proposed more particularly in cases of scirrhus, and where the orifice presents such a resistance to the contractions of the womb that the woman is exhausted in vain efforts without effecting its dilatation; lastly, it would be equally well indicated, as M. Bodin has attempted to demonstrate, in cases of arm presentation, should it ever in any case be found really impossible to proceed in search of the feet, and if no other means of avoiding the amputation of the arm could be availed of.

1161. Although generally attended with but little danger, the

accoucheur would be blameable who should perform it without a well-ascertained necessity; I cannot therefore but condemn in decided terms the temerity of those practitioners who do not hesitate to employ it, simply because the os uteri happen to be somewhat tense, and does not dilate according to their impatient desires; and according to what I said when speaking of *deviations of the os uteri*, I have no doubt that it has often been performed when it might have been easily dispensed with.

In all cases, if there is an orifice, nothing is easier than to perform this operation; the speculum employed by some persons is of no use; a probe-pointed bistoury, wrapped round with a narrow strip of linen to within eight or twelve lines of its point, is passed up upon the index finger; in this way we carry it without difficulty within the os uteri, provided it be not too far distant from the centre of the pelvis; in the contrary case, Pott's curved bistoury should be substituted for the straight one. Strictly speaking, one incision might be deemed sufficient; but as it is important that it should not be too deep, it would be preferable to make several of them at a small distance from each other. At a first view it would seem that the passage of the head could not take place without enlarging such wounds so as to extend them to the body of the womb, and lacerate the peritoneum; but in fact this does not happen, and they commonly remain limited to the substance of the os uteri. In operating for a scirrhus or fibrous induration, but a very few ounces of blood are found to flow from the wound. M. Dugès is, in my opinion, right in recommending that all the diseased parts should be removed at once, instead of merely incising them.

1162. When the anterior wall of the uterus is divided without extending the cut down to the os uteri, we are obliged to make use of a straight, or convex, and not a probe-pointed bistoury, to begin the operation with, which is always a more delicate one than the preceding. Too much care cannot be taken to avoid wounding the presenting part of the fœtus while making the incision. But, when the womb has been once penetrated, the forefinger becomes a sure director, and the instrument may enlarge the wound as much as necessary, without any danger; let us however observe that there is less hazard in extending the incision backwards than forwards, on account of the bladder, and also, that it is useless to make it very large. After the delivery, the wound contracts very rapidly, and it often happens that not a half day elapses before the os uteri recovers its natural situation. If the blood should flow in too large a quantity, it would be easily arrested by injections of oxirate, and by the tampon; and the cautery, which is easy to apply, will rarely be necessary in such cases. As to the lochia, they escape either from the wound or from the orifice of the uterus, and in these respects the woman

requires only such cares as are common after an ordinary parturition.

SECTION 6.

Of Cephalotomy and Embryotomy.

1163. In England the perforation of the cranium or reduction of the fœtus, by removing successive portions of it, even where it is still known to be living, is generally preferred to the Cæsarian operation. Wigan, combated by Busch, maintains the same sentiment in Germany. In France the operation of cephalotomy is not performed except where the death of the child has been certainly ascertained or at least become very probable, and where the delivery by the natural passages is altogether impossible. When the pelvis has a diameter less than fifteen lines, or the whole hand cannot penetrate into the womb, the Cæsarian operation is preferred, even though the child be dead. Upon this subject I will remark that our neighbours too rarely have recourse to hysterotomy, and that they are too ready to sacrifice the child, for fear of compromising the life of the mother; that here we fall into an excess of quite an opposite kind, and which is, perhaps, scarcely less blameable. In a case where every circumstance announces that the fœtus is still in full vigour, and that it is robust, there is no doubt that, instead of sacrificing it, as is done in Great Britain and at the north, it ought to be extracted without endangering its life, by means of operations which indeed are severe, but not always fatal to the woman; there is also no doubt, in my opinion, that cephalotomy ought to be preferred when there are good reasons for fearing the child's death, or for believing that it cannot continue to live. It would be too cruel, after performing the Cæsarian operation, to be able to present only a corpse, or a feeble, miserable being, which must perish in a few minutes or hours, to the unhappy mother as the price of all her sufferings and dangers! But it would be a great mistake also to suppose that embryotomy is wholly unattended with danger to the mother; it is, on the contrary, one of the most redoubtable and revolting operations in tokology, whenever it extends beyond the mere operation of craniotomy.

1164. To sum up, the operation of cephalotomy is indicated, 1. When the fœtus is dead and the passages are too much contracted to permit its extraction with the forceps or by turning; 2. When it is very probable that the child is dead, or at the point of death, and when it cannot be got away whole without the performance of the operation of hysterotomy; 3. When the head alone remains in the pelvis and cannot be extracted by the hand,

the forceps, or crotchet. It would be useless, dangerous, and ought to be proscribed even in case the fœtus were dead, provided the small diameter of the inferior strait were less than eighteen or twenty lines in extent.

1165. Embryotomy, that is to say, that operation which consists in introducing a cutting instrument within the cavity of the womb, for the purpose of lessening the size of the child, dividing, and reducing it to small peices, so as to be afterwards able to extract it piece-meal, was frequently employed by the ancients, who had no other resource, and did not confide enough in the powers of the system ; but at the present day the forceps, the lever, turning, symphyseotomy, and the Casarian operation, properly appreciated as to their respective value, render it almost wholly useless ; it is therefore no longer performed at the present day, except by certain country medicasters, who are as ignorant of the art of midwifery, which they disgrace, as they are of the plainest principles of the other branches of medicine.

1166. Even the operation of craniotomy must very rarely be necessary or indispensable, since out of a total of more than twenty thousand labours Madame Lachapelle has indicated only three instances of it.* In performing it, Avicenna and Mauriceau made use of sharp extractors in the shape of a crotchet ; Levret, Denys, Fried, and Ould, made use of sheathed perforators ; Simson boasted of a ring-scalpel ; spear-pointed perforators have been recommended and modified in an infinite variety of ways ; but at present a single bistoury is employed, or the scissors of De la Motte, improved by Smellie and by Walbaum, are made use of when it is necessary to penetrate to a great depth within the organs, and to exert a certain degree of force to perforate the bones.

1167. The woman should be placed as for the application of the forceps ; the bistoury, wrapped with a small linen roller to within a few lines of its point, which Baudelocque guarded with a small ball of wax, is directed along the palmar surface of one or two fingers of either hand, previously introduced into the vagina, and so on to the head which is to be opened. To insert the scalpel, a fontanel, or at least a suture, is to be selected, when the vertex is the presenting part ; where the trunk of the body is delivered we may be obliged to perforate the bones themselves, in which case we address the instrument to the forehead, or even to the base of the occipital bone. When the head is left in the pelvis, we ought also to endeavour to find one of the membranous spaces ; but it is not always easy to reach them, and the accoucheur must then choose the bone which offers the least resistance, and

* Dr. Collins, of Dublin, states that 79 cases of delivery by lessening of the head, occurred out of the whole number of cases during his mastership of the Lying-in Hospital.—The whole number is 16,414 cases, or one in about 206 labours.—M.

which his finger can touch. During this operation, if the head be somewhat movable, an assistant ought to embrace the womb with both hands, as advised by Celsus, and push it down towards the strait, so as to steady, as much as possible, the parts about to be divided. On the other hand, the point of the instrument ought never to move, while within the maternal organs, without being guarded by covering it with the point of one of the fingers. When it is once plunged into the cranium, the incision is prolonged as far as possible, at least to the extent of an inch; most commonly, we should not be satisfied with making only one incision; we ought to make a crucial opening, through which the finger may be passed so as to break up the brain, which may also be lacerated with the cephalotome itself.

If Smellie's perforator is selected for the operation, it is to be introduced and shut with the same precautions pointed out when speaking of the use of the bistoury; when closed it resembles a common cephalotome; but as the two branches of which it is composed are sharp on their outer edges, when they are opened, it necessarily enlarges the incision at first made by its introduction, in direct proportion to the degree of the opening; it is then shut, to be opened again in another direction; after which it may be made use of to reduce the brain to the consistence of gruel.

If the disproportion betwixt the child's head and the pelvis is not considerable, and the womb still retains its energy, the remainder of the labour is confided to the efforts of the woman, and terminates with much rapidity; in the contrary case, we are obliged to resort to the employment of the forceps, or crotchet. The forceps would be always preferable where it could be applied, and when the head is still somewhat firm; and provided it were not so liable to slip and lose its hold, upon the application of some degree of extractive force.

SECTION 7.

Of Crotchets and their Use.

Crotchets were formerly employed in almost all the cases that are now happily terminated by means of the forceps, and in an infinity of others, which by means of turning, or the skilful use of the hand are capable of being brought to a favourable conclusion; but their employment becomes more and more rare, as the knowledge of obstetrics, extends, as well as that of all the other destructive instruments which were so much abused by the ancients.

1168. Crotchets are of two kinds: one, terminated by a blunt and rounded extremity, or else of an olive shape, and more or less bulbous, which are proposed as substitutes for the fingers or the

fillet, do not divide the parts of the child, and are applied either while it is living, or after its death, upon different parts of its body. They are constructed of various forms. It has been recommended that they should all be replaced by the one which terminates the handle of the modern forceps; but the best ones consist of a long piece of steel, supported by a wooden handle, and curved into an arc of a circle, the sinus of which is sufficiently open to embrace without difficulty the groin, the ham, or the axilla; when only bent at a right angle, as advised by Madame Lachapelle, they slip too readily; if bent into the shape of the letter S, or contracted in too acute an angle, they will not fit accurately to the part on which they may have to be applied; Baudelocque, Steidèle, and most of the accoucheurs of the present day, have imagined that the too blunt crotchets of the forceps might be united, so as to form a pincers with a curved end, and to be applied to both groins at once; but it does not appear that such a modification can ever be wanted. A single branch commonly suffices, and, with the exception of a few cases, the fingers are a very good substitute. The utility of the blunt crotchet, however, can scarcely be doubted when from any cause whatever the head has been separated from the trunk, which cannot be extracted except by acting upon the axilla; in such a case, as in breech and knee positions, the only rule that it is important to follow is, always to act upon the bend of the limb that looks to the back part of the woman's pelvis, and in drawing down, not to lose sight of the axes of the pelvis.

1169. The point of the sharp crotchet is sometimes round, as in the olive of the forceps, sometimes flat and triangular, as in Mauriceau's and most of the ancient instruments, so that the entire instrument is nothing more than a cephalotome with a bent blade. This point, which is single in some and in others double, may be continuous with a straight or with a curved stem, or it may resemble a hook of a chain, of greater or less length, like what is seen in Scultetus's *Armamentarium*; the point, which in most of the specimens is fixed, may however bend, and also open as in the instruments of Aitken and Saxtorph. Forceps or pincers with sharp crotchets have also been constructed; Mesnard, Levret, Smellie, Baudelocque, and many others have boasted of the value of the crotchet-forceps, a model of which is to be seen in the *Museum de la Faculté*, and which are nothing more than Smellie's small forceps without fenestres in the blades, which are terminated by a triangular, sharp and bent point. The forceps with *wolf-teeth* of Avicenna, and the dentated pincers of Rueff ought also to be classed among the sharp crotchets.

1170. After the performance of craniotomy, if the powers of nature are insufficient, Burns thinks that we ought to wait twenty-four hours before we resort to the triple forceps of Levret, and more especially to the sharp crotchet; he founds this doctrine on

the circumstance, that the fœtus, passing rapidly into a state of putrefaction, softens, and becomes much easier to extract the longer we wait, even admitting that it shall not be spontaneously expelled.

This practice, although recommended by Kelly, M'Kenzie, Denman, Osborn, Boer, Simson and Asdrubali, does not appear to me to be one that ought to be followed; I agree with M. Dugès, that it is useless to protract, in this way, the patient's anguish; and besides, a labour that is already tedious cannot be with impunity protracted for twenty-four or forty-eight hours longer; and were there no other reason than the necessity for renewing the preparations for a forced delivery, which are always frightful, it ought to be rejected.

1171. The sharp crotchet is to be applied to one of the most solid parts of the cranium, for example, to the occiput or the mastoid process, when the head comes foremost; upon the lower jaw, in the orbit, or upon the forehead, when it descends after the trunk; in short, in such a way as to prevent, as far as possible, the occipito-mental diameter from abandoning the line of the axes of the pelvis, and to retain it in its natural state of flexion. It may also be applied inside of the cranium, by fixing it on the petrous portion or the basilar apophysis; but in that case it is of essential importance that it shall not slip, that it shall not act upon one of the bones of the vault of the cranium, for by pulling them downwards it might pass through them and injure the organs of the woman. Like the perforator, the sharp crotchet ought never to be plunged into the fœtus without being guided, in some sort protected, or even covered by the accoucheur's finger; when fixed either on the interior or exterior of the cranium, the stem must be supported by the thumb, while the fingers remain firmly applied to the opposite side of the head, and the other hand applied to the handle exerts the requisite extractive power. In this way it cannot let go its hold without the accoucheur's perceiving it at once; both the hands also act in concert, their efforts may be exactly combined, and the operation ceases to be dangerous. There is no longer any danger of those dreadful slips, which chance alone could prevent, when the operator is so rash as to pull, blindfold as it were, with a single instrument.

1172. When one of the bones breaks or gives way, the crotchet must be again applied, upon a firmer part. Some advise that the point should be directed in front toward the pubes. Others have directed it to be applied behind, for the purpose of more easily drawing the head down through the superior strait; but it is not easy to lay down general rules on this subject; we must act in either way, according to circumstances. Should the head rise up again, strongly, whenever we cease to pull with the crotchet

fixed at the back part, it would be well to follow M. Dugès' plan and fix a second crotchet in front, while the head continues to be held down with the first; this may be got higher up, or a third instrument may be attached while the head is kept as low down as possible with the others.

To force the base of the cranium to clear the superior strait, we sometimes meet with obstacles that are excessively difficult to overcome. The bones of which it is composed do not bend like those of the vault of the cranium, and the crotchet is quite as incapable of lessening its size as the forceps; it is only by engaging it in an oblique direction that we most generally succeed in extracting it in cases where the antero-posterior diameter does not exceed two inches or two inches and a quarter.

Perhaps the *terebellum* of M. Dugès might be beneficially employed in such cases as these: this is a sort of cooper's turrel, which is capable of perforating the bones and cartilages, of breaking up the base of the cranium so as to render it flexible, and of acting as a substitute for most of the cephalotomes.

1173. M. Baudelocque, Jun., has lately constructed a forceps, the object of which is to overcome all these difficulties, and to render all the perforators and most of the sharp crotchets superfluous. The clams of this forceps are not fenestrated, and are but slightly curved; so that by being closed they may pass through a strait that does not exceed fifteen lines in its small diameter; through the handles of the instrument passes a screw, which enables them to be closed with such force that the head of the fœtus will be easily reduced to any desirable dimensions without exposing the woman to the least risk. This instrument appears to me to be an ingenious one; but previously to forming a decided opinion concerning it, I should like to have an opportunity of seeing it employed in a case of labour.

1174. However, when the base of the cranium has reached the excavation, the head may be taken hold of with the hands, and the crotchet is of no further use, unless it should be applied to the trunk, supposing, moreover, that the blunt crotchet when applied to the axillæ should prove incompetent to the extraction.

In this, as in all cases where the head is completely separated from the body, there are only three points upon the trunk which can bear the action of the sharp crotchet; these are the spine, the sternum and the ribs, and even the latter is a very insecure hold, so that the whole of the ribs of one side are sometimes found to give way one after the other, as soon as a certain degree of extractive force has to be employed. It is therefore particularly upon the vertebral column that we should endeavour to fix the point, and then act as we should have to do provided it were attached upon the head.

1175. There is one single circumstance which seems to me to

require the use of the sharp crotchet upon the trunk in a pelvis presentation; it is where the lower limbs have been separated from the body, or where they are wanting in consequence of monstrous conformation, or where they do not admit of a hold being taken, sufficiently firm to pull the body down by them. In such cases the crotchet should be applied to the pubis, the crista of the ilium, or what is still better, to the sacrum.*

SECTION 8.

Of the Extraction of the Head when it has been left alone in the Genital Passages.

1176. When the head is separated from the trunk, and left in the pelvis, it almost always happens in consequence of its being badly situated at the superior strait, or because the accoucheur was not skilful enough to disengage it in time: in this case the detachment no sooner takes place than the head becomes in some sort movable in the womb, which soon brings it to the best possible situation; a few pains then succeed in expelling it, and the assistance of art is, for the most part, unnecessary. In other cases the detruncation of the fœtus takes place because, having been dead for some time, it is already nearly in a putrid state. If we wait for a short time, under these circumstances, the brain shrinks, the bones of the cranium become very movable, may over-ride each other, and although at first the pelvis might have been too narrow, the head nevertheless escapes spontaneously at last; upon these results, and also upon the evils that have often been found to follow upon unskilful attempts to hasten the delivery, the English practitioners cited above found the precept that the expulsion of the head should be confided to the powers of nature alone; but as the labour has already lasted too long, and as in some instances it would be necessary to wait several days as the extreme irritation of the uterus would expose it to the hazard of becoming inflamed, and the woman might die of exhaustion before the escape of the head, it would be imprudent and unreasonable not to

* The crotchet is a most detestable instrument, on account of the utter want of security which every conscientious physician must feel, who is, by stress of circumstances, compelled to make use of it. In a very bad pelvis, it is more dangerous than in such as are not very much deformed; and the danger of its application becomes enhanced by every degree of diminution in the pelvic diameters. For my own part I abjure it, since I have employed the craniotomy forceps, described in the Phila. Prac. of Midwifery, to which I beg to refer the reader.—With the instruments there described and figured, I believe it is quite practicable to deliver, per vias naturales, whenever the diameter is not below one inch and a half, and with a perfect assurance that the patient shall not suffer from any wound inflicted by the instrument itself. It is manufactured by Mr. John Rorer, North Sixth st., Philada.—M.

give proper assistance. We ought not, says M. Désormeaux, to act with inconsiderate haste; there are cases where it is proper to temporize; it may be necessary to restore the strength by means of some aliment, a little wine, or other strengthening articles. Baths and antiphlogistics, &c., may be required previously to any other recourse in consequence of an incipient inflammation of the womb or peritoneum, &c.

In cases where the hand alone may suffice, that is to say, where the head is small, or requires to be placed in a better situation for descending, an attempt should be made to get hold of the lower jaw, then, after having brought the occipito-mental diameter into line with the axes, it should be drawn down as far as possible, coincidently with the efforts of the womb or those of the patient.

Next to the hand the forceps is the best and safest resource that we have; but it is not always possible to apply it, while the head is still at the superior strait, and in some cases its employment does not always obviate the necessity of having recourse to craniotomy, or even to the sharp crotchet. It is true, that for the purpose of avoiding the latter measures, a great variety of extractors (*tiretetes*) have been proposed; but none of them can be regarded as good substitutes. The double cross of Bacquié, the *bascule* of Levret, the basiocester of Metzler, the sling of Mauriceau, the T of Stein, the nets of Amand, the cap proposed by M. Désormeaux, Sen., the forceps with three branches of Levret, the small piece of stick, to the middle of which is attached a string, or the one made of iron fixed to the end of the metallic rod in such a way that it may be introduced parallel to the rod, and after reaching the interior of the cranium, be altered so as to stand crosswise to it, the invention of which is attributed to Danavia, and also to Assalini, and which has been too much praised by many authors; all of these means have ceased to be made use of at the present day. The crotchet planted somewhere near the occipital foramen, in the upper jaw, or in some other firm part, whilst the opposite part of the head is supported with the fingers, is in this, as in some other cases, the last resource; but, nevertheless, it forms the only really efficient extractor in all cases where the hand, the common forceps, the toothed forceps, the extracting forceps, with three branches, or the crotched forceps, or the forceps of M. Baudelocque, Jun., are either inapplicable or insufficient for the delivery of the head.

CHAPTER VII.

OF THE NATURAL PHENOMENA WHICH FOLLOW THE DELIVERY OF THE FŒTUS.

ARTICLE I.

OF THE DELIVERY OF THE AFTER-BIRTH.

THE placenta and the membranes are, after the birth of the child, called the after-birth, and their expulsion, escape, or extraction is (*in France*) called *Delivery*. Like child-birth, this is a natural function, and like it, this function may be *simple* or *complex*, or, if the expression be preferred, *natural* or *preternatural*, *spontaneous* or *artificial*.

SECTION 1.

Of the simple or natural delivery of the After-birth.

All the phenomena of *simple delivery* are referable, 1. To the detachment of the placenta; 2. To its expulsion from the genital organs.

1177. *First stage.* The ovum becomes detached during the progress of a labour, and especially towards the conclusion, when the waters have gone off. Being in some sort an inert mass, its adhesion must necessarily be destroyed during the alternate contractions and dilatations of the womb, unless the labour be so prompt as to require almost no effort of the organism, or unless there be some preternatural adhesions.

The cause of this detachment is found in the entire uterus, and not merely in the orbicular muscles which Ruysch supposed he had discovered. Sometimes the detachment takes place in such a way that the foetal surface of the placenta presents first at the vulva, and the blood, either fluid or coagulated, collects behind the spongy surface of the cake, which is concave, like the bottom of a bottle; sometimes it is effected gradually proceeding from the centre to the circumference, or it may begin on the edge, and if the involucra resist long, the smooth or internal surface may

become the outer one, and the blood being confined on the outside of the membranes, does not escape until after the expulsion of the after-birth, the size of which it sometimes surprisingly augments.

At other times, in detaching itself, the placenta rolls up in the shape of a cylinder or *cornet d'oublic*. In that case it presents by its uterine surface or by its edge to the several passages; the blood, not being confined, flows out at the vulva as fast as it is poured into the womb, and commonly ceases to flow as soon as the placenta is delivered.

Second stage. When once detached, the placenta presses upon the os uteri, engages in the orifice, which it irritates, and the womb, which is irritated by its presence, becomes more and more constricted, contracts, and soon forces it to pass into the vagina. When there, it soon gives rise to a sensation of uneasiness, tenesmus, or bearing down, which still solicit the contractions of the womb, and bring into play the efforts of the abdominal muscles. The diaphragm and muscles of the belly react upon the abdominal viscera and womb, as if for the expulsion of the fœtus, and the placenta clears the inferior strait.

Some persons, and among them M. Désormeaux, divide this period of expulsion into two stages. It is true, that in order to pass from the womb into the vagina, the after-birth sometimes requires so considerable a degree of dilatation of the os uteri, that a particular stage might be made of it, and that it may afterwards remain so long in the passage that its entire expulsion really constitutes a distinct period; but as these two stages are far from being always so distinctly marked, it appears to me that they may without inconvenience be confounded together. However, this is an affair of choice, not of necessity.

If the labour have been a long one, if the woman be strong, if the means of art have been applied for the extraction of the child, and if the womb be in a state of considerable energy, the placenta falls into the vagina and presents itself at the vulva almost immediately after the delivery of the child. In opposite cases, the delivery of the placenta does not take place for half an hour, and sometimes even for several hours. It may also happen, that it shall not take place for a whole day, or even for several days. This difference is easily explained: in the first case, the ovum which has been long detached descends whole, along with the fœtus. The womb, contracting strongly in proportion as it empties itself, simultaneously throws out both the child and placenta. In the second, the promptitude of the delivery of the child is so great that the womb has not had time to break up the adhesions of the ovum, or to contract sufficiently. Until the cavity of the womb becomes so diminished that the after-birth fills it quite up, it may remain above the orifice. When the child has just passed through the os uteri, provided the placenta be detached at the time, and

urged onwards by the uterus, nothing can prevent it from descending : but if the orifice closes before the body of the organ becomes reduced in proportion, the after-birth remains shut up as it were in the uterine cavity, and cannot escape for a considerable length of time, although its adhesions may have been broken up from the beginning.

1178. Although the organism generally suffices to finish the expulsion of the after-birth when it has reached the excavation, some cases are, however, observed in which it would remain there for an indefinite period, provided its escape were not promoted by artificial means. It is on account of this tedious slowness, and to relieve the woman of her fatigue and uneasiness of mind, that a natural or simple case of delivery of the placenta is scarcely ever wholly abandoned to the efforts of nature. De la Motte, Deventer, Peu, and some modern authors, are scarcely willing that we should wait for it for half an hour: according to them, if we do not act at once, the orifice closes, and may retain the after-birth, from whence accidents of greater or less severity may ensue. Levret and Smellie, Baudelocque, and almost all practitioners of the present day advise us, on the contrary, not to act until the placenta is completely detached, and presents itself spontaneously at the orifice of the womb.

Both of these doctrines, if taken according to the very letter, appear to me to be equally incorrect. The practice of the ancients, if followed without exception in all cases, would doubtless sometimes be dangerous; but I am induced to believe that at the present day we have fallen into an opposite extreme; by endeavouring to follow nature as closely as possible, the end which the accoucheur ought to hold in view has been lost sight of.

Besides, if it is proper to act as soon as the placenta is detached, I do not see wherefore the delivery should be so frequently deferred; for except in a few cases, this detachment takes place previously to the expulsion of the child. I can scarcely conceive, indeed, how the womb can be reduced to a fourth or fifth part of its volume, without destroying the delicate filaments which connect it to the ovum. Most of the facts that are cited to show that the adhesions of the placenta continue to exist after the birth of the child, are any thing rather than conclusive, and do not seem to have been properly interpreted.

I know that when the cord has been pulled at an improper time, it has been found to occasion the inversion of the womb; but, in the first place, this accident is a very rare one; and next, it does not prove that the union of the placenta and womb was maintained at the time; for, if such tractions are performed while the womb is soft and uncontracted, whether the adhesions of the placenta be continued or not, they occasion the woman to bear down, and it is very natural that the womb should then be inverted. The cord has often been pulled so as to break it off, so as to give

TABLE IV.

Labours observed by MM. BLAND, MERRIMAN, DEWEES, ARNELL, MOORE, NÆGÈLE, BOER, Mesdames BOIVIN and LACHAPELLE, and at the Dublin Lying-in Hospital.

	Number of Children.	Twins.	Triplets.	Four at a Birth.	Boys.	Girls.	Dead.
Messrs. Dewees, Arnell and Moore . . .	About 35,000	About 200	Only 1	—	Uncer.	Uncer.	Uncer.
Madame Boivin . . .	20,517	153	3	—	Uncer.	Uncer.	Uncer.
Merriman	1,813	22	1	—	929	884	Uncer.
Dublin Hospital . .	106,766	2,110	26	1	55,804	50,962	9,497
Madame Lachapelle	37,895	444	5	—	19,474	18,421	2,291
Nægèle	415	6	1	—	199	216	31
Boer	15,608	Uncer.	—	—	Uncer.	Uncer.	Uncer.
“	or in 6,555 cases	92	—	—	Uncer.	Uncer.	463
Total	224,569	3,027	37	1	76,406	70,483	12,282

Thus there were 3027 twins, 37 triplets, and only one case where 4 children were produced at a birth in about 200,000 births.—146,889 yield 76,406 boys and 70,483 girls; and out of a total of 160,269 children, 12,282 were born dead. M. Schweighauser reports a second case of 4 at a birth; the public papers have mentioned a third instance in France of late years; Merriman speaks of a fourth, which occurred in Worcestershire, in 1820; and Oslander says, according to a letter, that a woman was delivered of 5 living children near Oporto in 1788.

pain to the woman, and make her feel a dragging sensation within, and the placenta, notwithstanding, has not been moved at all. All this is doubtless true ; but without speaking of the pretended uterine cristæ which have formerly been so much spoken of, does the womb never contract, except in a regular manner, upon the secundines? Does it not, on the contrary, mould itself, in some sort, upon the anfractuositities of the placenta, so as to make its extraction somewhat difficult? and then, are we sure that the extracting force has been applied in the best possible direction, and exactly to the proper extent ; have not the faults of the accoucheur been most commonly attributed to the adhesion of the placenta? In my amphitheatre I have many times seen the students leave off pulling at the cord from a conviction that the placenta was not detached, whereas I had only to pull in a rather more methodical manner than they did, in order to terminate the delivery at once, and without difficulty, in their presence. In a woman who came to be delivered at the *Hospital de l'Ecole*, and who had a flooding, the cord had already been pulled so as to break it off. I introduced my hand into the womb and found no adhesion at all. Being called to visit a woman, in the Rue de la Montagne-Sainte Geneviève, whose child had been born six hours, I learned that all imaginable efforts had been made to bring away the placenta. The physician had asked for assistance only because he was convinced that the hand must be introduced into the womb in order to destroy the adhesions of the placenta. He repeated his attempts in my presence, and I soon found he would not succeed. I now took hold of the cord, and found that there was no particular difficulty in bringing away the after-birth. I have so frequently met with these cases of supposed adhesion ; I have so often introduced my hand into the uterine cavity with the design of destroying them, when I was informed that they existed, and when in fact they had no existence ; and from reasoning it is so difficult to admit them, that I do not hesitate to look upon their occurrence as very rare. How can we conceive, in fact, that they could give way so easily under the feeble contractions that take place after the expulsion of the child, after having resisted the violent efforts of the close of the expulsive stage of the labour? I believe, therefore, that if it is not prudent to deliver the after-birth immediately after the escape of the child, we ought to look for another reason for the caution than the non-detachment of the placenta ; that the object of the uterine contractions and their effect are far more to push this body gradually through the os uteri and into the vagina, than to break up its union to the womb ; that it is not indispensably necessary for the woman to have colic pains and dragging sensations in the loins before the accoucheur delivers her ; and that there are some disadvantages in not acting as soon as a favourable opportunity presents itself.

Being (in 1823) still imbued with the prevailing ideas on this subject, I used to wait until the pains came on before I proceeded to act, and I stopped as soon as I perceived the slightest resistance; and in the short space of six months, I was obliged to wait, on one occasion ten hours, on a second twenty-four, on a third thirty-six, on a fourth forty-eight hours, before the placenta was delivered, and in the last case, was even obliged after all to introduce the hand in search of the placenta. Since that time I have never been obliged to wait more than one hour; for me it suffices when the womb has contracted and become hard, even although the woman have felt no pain, nor dragging sensation; and up to the present time I have had good reason to be satisfied with my mode of proceeding.

1179. Thus, after having given the first necessary attentions to the child, we return to the mother, and if the hand applied to the hypogastrium feels the womb contracted with a certain degree of force, we assist the delivery of the placenta; when the uterine globe does not form, we ought to wait, or make use of the measures proper to remove inertia.

To favour the expulsion of the after-birth, the cord is to be taken hold of with the right hand, twisting it round the root of the middle and ring fingers, and then bringing it betwixt the thumb and index finger; or it is merely taken hold of with the hand after being wrapped in a piece of linen, and always, as near as possible to the vulva; two or three fingers of the left hand are then to be slipped into the vagina, passing them under the symphysis of the pubes to the orifice of the womb, or as far as the root of the cord; as these fingers are to form a sort of gutter or pulley, I prefer three rather than only two fingers, because as the medius forms the bottom of the groove, the index and annularis easily prevent the cord from slipping off to the right or left, whereas, if only two are made use of, the cord almost always separates them, and therefore it would be quite as well to place them crosswise, in the upper part of the vulva, as is the practice with some persons.

The way to derive the greatest possible advantage from them is to pass them up as far as the foetal surface of the placenta, even should that be above the os uteri, and then make them act like a lever of the first kind. The back of them rests against the top of the pubic arch, and while the other hand is drawing the cord along the axis of the inferior strait, they are pressed against the root of the cord; then by a sort of see-saw motion, communicated by the gradual rising of the wrist, they force the placenta along from above downwards and from before backwards, towards the point of the sacrum, and in the axis of the superior strait.

This stage of the operation is the most delicate, the most important, and most difficult to perform well. The womb is sometimes so bent forwards that if the fingers do not push the cord

almost directly backwards, the placenta remains immovable ; at other times they must be directed a little to the left or right, because the os uteri is deviated more or less to one side or the other ; the axis of the womb, besides, presents a thousand shades which it would be necessary to apprehend, and which practice alone can enable one to recognize. This is the reason why a *delivery* deemed by one accoucheur to be impossible, will often be quite a simple case to another person ; and why this operation, in appearance so easy and unimportant, deserves, notwithstanding, the most minute attention from those who desire to perform it well. Should the pulley (composed of the ends of the fingers) be not well placed ; should the lever represented by the fingers not be well situated, or not act properly, the after-birth, from being arrested by the upper edge of the pubes or the posterior surface of the symphysis, would not come down ; the whole of the power would be directed upon the root of the cord, which would certainly break, or upon some part of the uterine orifice, whence that dragging and pain which give rise to the idea of preternatural adhesions.

Be this as it may, when the placenta has come down into the vagina, the fingers of the left hand should be continued in the same situation they occupied before, but merely so as to favour the escape of the membranes which might not have cleared the os uteri, and to form a sort of inclined plane, along the inferior surface of which the whole after-birth might glide while pulled by the right hand along the axis of the inferior strait. In this way the hand that holds the cord may be raised upwards without fear of being embarrassed by the pubic arch, and we avoid being stopped by the inferior surface of the perineum ; which is an inconvenience frequently met with when the placenta is pulled along in what is properly called the axis of the strait, rather than in that of the vulva.

As soon as the after-birth appears at the vulva, the left hand is placed underneath it, crossways, and supine, in order to sustain it ; the right hand, in pronation, takes it with the ends of all the five fingers, and rolls it four or five times round, drawing it moderately and slowly downwards ; without these rotatory motions the membranes might separate from the placenta, and remain within the female organs, while if twisted in this way they are collected together and resemble a rope, and become easy to extract.

During these various manœuvres, the womb rarely fails to contract with more or less force, and seems to assist the accoucheur ; the woman herself is generally induced to make some efforts as soon as the womb has descended into the vagina, and these efforts, rigorously speaking, would suffice to terminate the delivery, provided they always took place ; but, in reality, they are not very necessary, and may often be injurious : they only favour the expulsion of the placenta indirectly, and are capable of directly

producing the descent or inversion of the womb; the woman ought therefore to be urged to moderate rather than enforce them; it would not only be useless or ridiculous, but also in some cases very dangerous to administer sternutatories, or advise her to blow into a bottle, or in her hands, or on to a grain of salt to hasten the delivery; for if ever such measures have any effect, it is merely by occasioning certain succussions, or those straining efforts that I just now was condemning.

The extracting force necessary in this operation ought never to be carried so far as to rupture the cord: if the placenta resists, the cause of it ought to be sought for in the direction of the orifice, its closure, &c.; we should wait, or else pull in another direction, and be assured that force is never necessary to enable us to triumph over such obstacles.

1180. It is recommended that the after-birth should be examined as soon as it is delivered, to make sure that no part of it is left within the genital organs: it will be well to follow this advice, no doubt, whenever the delivery has been attended with some difficulty, or any peculiar circumstances; but in other cases, it would be puerile to trouble one's self about it, especially considering that even should some small pieces of the placenta or shreds of membranes be left in the womb, we should not be authorized on that account to introduce the hand in search of them.

SECTION 2.

Complicated Delivery of the After-birth.

Inertia, hemorrhage, convulsions, syncope, the rupture of the cord, preternatural adhesions, an encysted state of the placenta, excessive size of it, and a spasmodic contraction of the os uteri, constitute a number of accidents which sometimes complicate the delivery, and require that we should hasten or protract the term of its exclusion.

1181. *Inertia of the womb*, after delivery of the child, is more particularly observed to happen in women who are weak and exhausted by flooding or the fatigue of a protracted labour; it is also met with after too sudden a delivery of the child, and in these different cases it requires a caution which is peculiar in each. Sometimes the proper remedy is a little good wine, sometimes a little light and analeptic aliment, at others rest; but it is always useful to excite the womb through the hypogastrium, by rubbing and pressing it with the ends of the fingers, and even by compressing it with a certain degree of force, alternately from above downwards, from side to side, and from before backwards, as if with a

view to *mass* it, and oblige it to contract its dimensions. Pulling at the cord, if attempted previously to the cessation of the inertia, would hazard the production of an inversion of the womb, less, perhaps, in consequence of any remaining adhesions of the placenta, than from the direct pressure of the abdominal viscera upon a soft and contracted bag; transmitted to the internal surface of the gestative organ, they might, also, invite an affluxion of blood to it, and give rise to hemorrhage. They must therefore be dispensed with, unless some serious accident obliges us to act otherwise. Thus, inertia of the womb ought to be classed among the complications which retard the delivery of the placenta.

1182. The *volume* of the after-birth is in some instances the only cause that retards its expulsion. But this excess of size is often more apparent than real, and depends on the blood being amassed behind the membranes. Where the placenta is really too large, moderate and skilful tractions almost always suffice; if not, we must wait, and the natural retraction of the uterus at last renders its extraction easy. In the second case, which is the most common, if the contractions of the womb, and force carefully exerted upon the cord, are inefficacious, the membranes may be torn, or the placenta itself perforated with the fingers, and a passage made for the fluids behind them.

We should moreover have reason to suspect the existence of this state of things should the womb be found to preserve a larger size than common above the pubes, although not deficient either in firmness or enegy; were the after-birth already in the vagina, the diagnosis, and the application of suitable means would be too easy to be spoken of at greater length in this place. Upon the whole, excessive volume of the appendages of the fœtus scarcely constitutes one of the accidents of *delivery*, unless, indeed, it be coincident with some other complication.

1183. I may say the same of the *spasmodic contraction of the os uteri*. In fact, it is difficult to conceive that an opening, through which a child has just passed, can contract spasmodically to such a degree as to oppose the escape of the placenta. To admit such an obstacle, we ought, which is not the case, to have some very authentic instances of the kind.* Besides, as it is not a part of

* A spasmodic closure of the orifice of the womb after delivery, is a very common consequence of the use of ergot. It has so frequently followed the administration of that medicine, that it constitutes for me, one of the objections to its employment. I have, on several occasions, been obliged to dilate the os uteri by the introduction of the whole or one half of the hand, in order to admit of the escape of the placenta, which I found completely detached and compressed by a contracted womb.

I may take this opportunity to say, that when the placenta does not come off in an hour after the birth of the child, there is little hope of its discharge being effected in two hours, or four, or six—and that it is better to remove it at most in an hour after the child is born.—M.

the nature of spasm to persist, we might, should such a case occur, refer it to the effect of time, and content us with administering some composing or antispasmodic medicines, according to circumstances.

1184. It is evidently the natural, but somewhat precipitate closure of the os uteri, which has been qualified as the spasmodic contraction; considered under this point of view it is a circumstance deserving of attention. When the delivery of the child is completed, the os uteri in general contracts more speedily than the body of the organ, and if in this case we endeavour to deliver the woman before the fundus is prepared to overcome the resistance of the orifice, the placenta passes through it with difficulty, which may induce a belief that it is spasmodically contracted.

A bleeding from the arm where the woman is strong, and there are any signs of irritation; emollient or slightly narcotic injections; the belladonna ointment, or even a bath, if she is very nervous, not strong, or has a vivid sensibility of the sexual organs, and there are any indications of the approach of convulsions or flooding; patience, and gentle frictions upon the hypogastrium; should no accidents appear, such are the measures that may be required by such a state as we have indicated: it is only when pressing and grave circumstances arise, that we are allowed to introduce a finger into the orifice to dilate it, while with the other hand we pull gently at the cord.

1185. *The encysted state of the placenta*, which Solinger calls *hernia of the after-birth*, has not been understood in the same manner by the different authors who have spoken of it; Levret never saw but one case of it, to which he was called by a midwife, who supposed she was treating a case of rupture of the womb. According to that author the encysted state of the placenta is occasioned by that portion of the womb which corresponds to the placenta remaining in a state of inertia, whilst the other parts of the organ contract with more or less force after the birth of the child. Simson, on the contrary, attributes it to the simple tendency of the womb to recover its primitive shape, a tendency which causes the internal orifice to produce, instantly, a real strangulation, above which is found the after-birth enclosed within the cavity of the body, as if it were in a small cell, while the cavity of the cervix remains open below. Plessmann has reproduced the idea started by Levret, but he has modified it: according to his view the womb must be much more highly irritated at those points which press directly upon the fœtus than those which only touch it through the placenta during the efforts of labour; whence it follows that the former contract sooner than the latter, and the formation of a separate sac for the after-birth is very easy to understand. Peu seems to think that the encysting depends upon a peculiar conformation of the uterus; Leroux

and Kok, that it most frequently depends upon the rupture of the nervous filaments, which occasions an afflux of humours, and, in consequence of that, a spasmodic contraction of some portions of the organ. All these explanations may be true in some particular cases; but Baudelocque prefers Simson's theory; M. Désormeaux, resting on a fact related by Meyeld, seems to be not far from adopting, at least in part, the view taken of the subject by Levret and Plessmann.

An encysted state of the placenta is always the result of irregular contractions of the womb, after the escape of the fœtus, but I do not think that these contractions can be explained upon the hypotheses of Simson, Levret, &c. In a woman to whom I was called by Madame Bevalet, the internal orifice of the cervix offered but a feeble resistance, whereas, a little higher up, I found a very decided constriction, and after penetrating into a cavity situated to the left of the womb, in which cavity a greater part of the placenta was contained, I was obliged to pass through another stricture, to get to the fundus and right side of the organ, where the remainder of the after-birth was retained. In another woman who died at the *Hospice de l'Ecole*, I found the uterus so moulded upon the placenta, that it was divided, as it were, into five shallow cells, and which evidently depended upon the protuberances formed by the corresponding cotyledons of the after-birth. If the placenta were solid and even, like the head, the womb in contracting would necessarily retain the form of an ampulla; but the cotyledons in the process of the detachment may separate from each other, and the placenta would then offer more resistance in some parts than in others; so that the uterus soon divides into several compartments or divisions more or less distinct from each other, in the same way as it is found to accommodate itself to the form of the head, of the shoulder, the breast, the pelvis, and all the projecting or contracted parts of the fœtus, after the liquor amnii has been evacuated. Besides, what accoucheur of any experience has not had an opportunity of observing, through the abdominal parietes, the womb tuberculated, more or less uneven or elongated, and not always globular or round, as it is too generally said to be.

1186. However it may be, the cyst may be formed by the fundus of the uterus, as supposed by Simson and Baudelocque, and then the organ approaches more or less to the shape of a calabash; sometimes, on the contrary, it is found to be upon one side, as was observed by Levret; and, again, in front or to the rear, and at points of different height. Le Roux says that in one instance the placenta was encased in the fundus of the womb like a watch-glass in the lid. But as such a case has not been noticed since, and there is every reason to believe that the author might have been deceived by some peculiar circumstances, M. Herbin

must have been mistaken also, when he thought the after-birth was encysted in the Fallopian tube, in a woman whom he was obliged to deliver artificially. •

The placenta, moreover, may be enclosed wholly or only partially within the accidental cell ; it is sometimes strangulated by the circle of the cyst ; so that one portion of it may remain free in the cervix while the rest of it is in some sort imprisoned above in one or more cells of the body or fundus of the womb.

1187. To have understood what has now been said in relation to encysted placenta is sufficient to enable one to guess at the signs of it. The treatment demanded by the case differs accordingly as it is or is not accompanied with some complications. If there be any complication, the contractions of the womb alone suffice to make them disappear ; these are to be solicited by means of frictions upon the hypogastrium, and judicious pulling at the cord. In fine, there ought to be no haste ; we must wait. If there is any threatening appearances of hemorrhage, convulsions, &c., or the safety of the woman appears to be in any way compromised, we must, on the contrary, make haste to act. The fingers are to be introduced one after the other into the mouth of the cyst, which is to be dilated gently and carefully, and afterwards passed by the *whole* hand in search of the placenta ; should there be a second opening, it is to be treated like the first, and in all cases the cord is a sure guide to the after-birth, which is detached and separated by passing the fingers, flattened, between it and the uterus, and which is lastly extracted by pushing it with the palmar surface of the hand down into the top of the vagina. Should the placenta be found only partially encysted, we might, after dilating the mouth of the cyst, dispense with going any further, take hold of it with the fingers, and immediately extract it. But it is in general, both a surer and quicker method to go into the very cavity of the cyst itself ; it being well understood that, during this operation, the hand that remains outside shall be employed in supporting the fundus of the uterus, inclining it to either side, and depressing it towards the one that is within the organs.

1188. The *rupture of the cord*, in itself considered, does not complicate the delivery of the placenta except by rendering the usual tractions impossible ; it may be prevented by ceasing to pull as soon as there is any threat of its giving way ; but it can only be remedied by going in search of the placenta with the hand ; and as long as there is nothing to fear for the woman, this recourse is unnecessary, and we ought to trust to the organism itself. It is particularly apt to take place when the cord is inserted near the circumference of the placenta, or when its vessels divide too soon, and separate like the rays of an umbrella upon reaching the placenta. In the first case the efforts concentrate almost wholly upon

the root of the cord, which yields before they can be transmitted to the after-birth ; in the second, the vessels are weaker than if they were united together ; further, as the force cannot act equally upon them all, they break very readily one after the other.

1189. The morbid or preternatural *adhesion* of the placenta may be either total or partial, slight or intimate. The ancient, Smellie, and others, refer it to a scirrhus state of the womb or after-birth ; many modern writers have preferred to attribute it to inflammation. But proofs are wanting on each side of the question. I have seen the placenta hard, thick, and yellowish, having lost its spongy appearance, sometimes in a few points, sometimes throughout the whole extent of its uterine surface ; I have seen it full of homogeneous masses, as large as nuts or partridge eggs, hard, and elastic ; but, in all these cases, the adhesion, instead of being stronger, was much weaker ; although rugose and tuberculated, its surface was smooth, and exhibited no trace of any laceration. I have also met with the yellowish alteration, the *placentas gras* as they are called, and almost all the alterations pointed out by M. Brachat of Lyons, and M. Gendrin. But, in common with M. Desormeaux, I have never observed any preternatural adhesion to accompany them. Besides, I have not found, by consulting the authors, that scirrhus has been noticed in the womb exactly at the place where morbid adhesions existed, and everybody knows that the placenta generally contracts a less intimate union with the fibrous tumours on which it is sometimes attached and developed, than with the uterus itself.

1190. As to inflammation, it may be admitted as a probable cause, in a certain number of cases ; for example, when in consequence of a blow on the belly, a dull pain and sense of heat are found to continue for several weeks, in the corresponding part of the womb, and an adhesion of the placenta to exist at the period of delivery ; but these phenomena often continue during the whole course of a pregnancy without any adhesion taking place ; and indeed adhesions are most frequently met with without any such precedent symptoms having been noticed. Moreover, it is known that the special character of inflammation of the mucous membranes is, to augment their secretions, and to terminate but very rarely in adhesion of their surface to the bodies with which they are in contact. Prudence, therefore, requires that we should wait for some new researches, before we pronounce upon this point of pathology.

1191. When the adhesion is partial, it occupies sometimes one portion, and at others the entire circumference of the placenta ; sometimes, on the contrary, the edges of the cake are free, and it adheres to the womb at one or more points of its surface, or at its middle. When the adhesion is general, a circumstance but rarely noticed, but which has notwithstanding been seen by seve-

ral practitioners, and particularly by M. Désormeaux, it exhibits different degrees of the affection like the preceding case. It may in certain cases be overcome by simply pulling at the cord, without our being obliged to enter the womb; in other instances it is so strong that the tissues seem to be confounded together, and it is impossible to overcome it without tearing the parts.

1192. I will not, with M. Désormeaux, say that we can *recognize*, but that we may *suspect*, or have a right to suspect, the existence of a morbid adhesion of the after-birth, when, notwithstanding the repeated contractions, hardness, and globular shape of the uterus, we find, by passing the finger up through the os uteri, that the placenta does not present, and does not yield to tractions suitably exerted upon the cord; by remembering, besides, what has already been said, viz., that a morbid adhesion is extremely rare, we ought to avoid confounding it with the cases in which the extraction of the secundines is rendered difficult by some other cause.

1193. Two very different modes of proceeding have been followed by accoucheurs in cases of pathological adhesion of the placenta: one party think it ought to be left wholly to the natural efforts; the others, on the contrary, think that we cannot too soon take measures to overcome it. On the one hand it has been thought that, by allowing the after-birth to remain for an indefinite period within the uterus, we expose the woman to the danger of flooding, or convulsions; that by becoming decomposed, by putrefying, this substance must act injudiciously upon the whole system, and particularly upon the genital organs and peritoneum, giving rise to fever of a bad character. On the other hand, it is asserted that these accidents are far more the effect of ill-timed manœuvres than of the protracted presence of the placenta. Haller, Sandifort, and M. de Saint-Amand, have reported cases of wombs that had been lacerated, inflamed, or gangrened, in consequence of attempts to break up preternatural adhesions of the placenta; the after-birth has been known to remain two, four, six, eight, fifteen or thirty days, or for months together, within the genital organs, without causing the smallest accident; if it becomes putrid, the lochiæ wash it away piecemeal, and its absorption may be easily prevented by means of injections; in fine, the dangers which, it would seem, ought to follow its forced detachment, have appeared to be much greater than those that might be involved in its retention for a greater or smaller period of time.

1194. There is reason on both sides of this question: although it is undeniable that the placenta may in some cases remain for several days in the womb without causing any accidents, it is very frequently the cause of very severe ones. It has a thousand times been seen to carry the woman to the very brink of the grave, and all the bad symptoms disappear as by magic, immediately upon

its expulsion: were new proofs of it wanting, I could refer the reader to two cases recently published by M. Goupil, and might cite those that have fallen under my own notice. As a foreign body, it irritates the womb, invites the blood to it, and is a constant cause of floodings, nervous affections, and pains of all kinds; the acrimony which it contracts in putrefying, and the odour which it develops, cannot be matters of indifference in a majority of women; the sanies and putrescence which result from its decomposition, will not remain in contact with the interior of the womb without penetrating, by means of imbibition or absorption, in greater or smaller quantity into the veins of that organ; and who will venture to affirm that it would not under such circumstances be dangerous? Although it has chanced that the hand by being introduced within the uterus has sometimes lacerated the parts of the woman instead of detaching the placenta, it must be attributed to a want of skill in the accoucheur, and not to the operation in itself considered; besides, the question is not whether we shall tear away or destroy, at all hazards, the intimate adhesions of the placenta, whether we shall *peel it off*, as the ancients did, but merely whether we shall carefully separate it and extract it whenever we can do so without lacerating the uterus. Upon this point I agree with M. Duchateau, and unless the child have been delivered for a long time, it would be a mistake to suppose that the introduction of the hand must be very painful and irritating to the womb. Is it reasonable to fear any bad effects from the gentle frictions of the fingers, or moderate tractions exerted with the hand upon an organ that has been for several hours contracting without any inconvenience, and with much violence before? Let me not, however, be understood as recommending here the introduction of the hand as soon as the placenta resists a little, and that I approve of those who, by conforming to the advice of Kushler, never fail to resort to it with the mere intention of removing coagula and other substances that may be contained within the uterus. My opinion is, that we ought to wait a few hours, and if there be no pressing haste from any other cause, we may wait even longer, if the woman is of a good constitution and has no troublesome disease of any sort; but in the other circumstances we should act without waiting too long.

1195. If the cord remains whole, we should pull at it in the way indicated when speaking of simple delivery of the placenta; when the cord is broken, we must attempt to hook a portion of the placenta itself in the fingers. Levret, Baudelocque and all the moderns insist very much on the necessity of drawing the cord down perpendicularly to the plane of the placenta. The following comparison has been made use of. If you pull at a piece of wet paper in a direction parallel to the plane on which it is applied, you will not detach but you will tear it, says Levret; but if you take

hold of one of its edges and turn it up, you may easily detach it without breaking it. According to the last-named author we must first endeavour to ascertain the spot on which the placenta is seated, for if it be in front, we shall make use of the fingers arranged like a pulley, as has been before mentioned, whereas, if it be situated on the posterior part of the womb, this pulley becomes useless, and it must be carried to the right or left, provided it be situated laterally.

This reasoning would doubtless be very correct, provided we were acting in a free space, or if the placenta were not attached to walls of the womb very much distended at the time; but it seems to be overlooked, that the fingers only support the cord below the mouth of the womb; that the after-birth touches the womb, both by its spongy and its membranous surface; that, in whatever manner we may take hold of it, the cord will always be parallel and not perpendicular to the great diameter of the womb, from its very insertion till it passes through the orifice of the organ; that by pushing it strongly backwards, in front, or sideways, as is recommended, we compel it to rub and slide on the corresponding point of the os uteri as on the groove of a pulley, without in any way changing its relation of direction to the placenta itself. It is as well, therefore, and even better, to place the three fingers in such a way that they may act at the same time like a lever and like a pulley, and draw the cord and rest of the after-birth down in the longitudinal axis of the womb; but as this axis may vary, may differ more or less from that of the strait, by inclining in front, to the right or the left: as it may remain straight, or become curved, or even zigzag, according to the position, form and direction affected by the womb, it will be consequently necessary to pull sometimes more, sometimes less towards the back or side, as I have already shown, in speaking of cases of natural delivery of the placenta. It is not until we have pulled at the cord, with all proper prudence, or where the cord will no longer bear the requisite force to be applied, that we may proceed to enter the womb in search of the after-birth. Provided the cord is still not broken entirely off, we make use of it as a guide; when it is completely separated, the hand will distinguish the placenta by its greater softness, its unevenness, if the external surface be touched, and provided the fingers come in contact with its fœtal surface, by its polished and slippery feel, and the vascular ramifications with which it is overspread; and in all cases by the less vivid sensation experienced by the woman when the hand is pressed on it, than when pressed on the womb itself. There is generally no difficulty in this exploration for an experienced person; but by carelessness it would not be impossible to mistake the projections, sometimes presented by the interior of the womb when it is irregu-

larly contracted, for the reliefs of the placenta, a mistake which in the hands of ignorant and unskilful persons would be dangerous.

When found, we should endeavour to get hold of some point of its circumference: if there is one which does not continue to be adherent; it is then detached by turning it over towards its membranous surface, or the advice given by Baudelocque may be followed: the ends of the fingers flattened out may be slipped between it and the womb; then by carefully moving them from side to side it may be detached just as we would separate two sheets of paper slightly adhering together: where the adhesion is found to be general, the hand, disposed as before mentioned, is passed along the external surface of some portion of the membranes, and then gradually to the circumference of the placenta; when there, it should act as has been described. Should the circumference alone have contracted morbid adhesions, as seems to have been noticed by Leroux, and the middle portion of the cake be depressed by the blood, as Baudelocque states to have happened under his own observation, we might, after the example of that practitioner, penetrate through the placenta, and then proceed as in the other cases. When its separation is effected, the hand brings it away by pushing it down before it; we ought to take care to leave no portion of it behind, and at the same time remove all the coagula that may be contained in the uterus.

1196. In acting thus, it very rarely happens that the adhesions cannot be safely destroyed. However, they are sometimes so firm that it is wholly impossible to make them yield. In such a case, the plan pursued by Smellie, Levret, &c., should be adopted, namely, to destroy the adhesions wherever they are not too firm, and tear and bring away all that we can detach, and leave the remainder to the natural powers. In peeling off the placenta we can go no further than this, and it would be extremely dangerous to persist in endeavouring to bring away the whole of it, and not leave the smallest portion behind in the female organs.

1197. Sometimes the portion of the placenta which we have been unable to detach separates spontaneously after a few days, and escapes along with the coagula; sometimes it becomes decomposed and comes away with the lochia; at others it is not discharged for a long time; Smellie asserts that one of his patients did not expel it until two months had elapsed, and it was then hard and quite dried up; Kerkring relates another instance where it was not passed away till full eight months. M. Prost has related two cases not less remarkable: in one, the after-birth was not expelled until the five hundred and third day; and in the other, until eight months and a half after the birth of the child. Although its presence may be found not to give rise to any accidents, some precautions ought nevertheless to be taken in regard to it: for instance, the fingers should from time to time be introduced into

the vagina to ascertain whether it be detached, and extract it as soon as it tries to engage within the os uteri; in case the fingers cannot get hold of it, recourse might be had to the *pince à faux-germe* of Levret, or to Dr. Dewees's crotchet; injections with mallows water, or barley water sweetened with honey, or even with decoction of bark, may be daily thrown into the uterine cavity, to cleanse it, prevent absorption, and bring away the detritus of the after-birth as they separate or putrefy.

It should not be forgotten, moreover, that these adhesions are the result of a disease, and that after their violent destruction, the inner surface remains in a pathological state calculated to excite some uneasiness, and that they leave behind them a sort of suppurating wound that it imports us to cleanse and heal.

1198. *Hemorrhage* may take place before the delivery of the placenta, as a complication of any of the accidents heretofore mentioned; but it is also observed singly; whether it depends upon inertia, spasm, plethora, or irritation of the womb, it is always a dangerous phenomenon, which we ought to make haste to combat; if the presence of the placenta is not the only cause, it at least serves to keep it up and aggravate it; we should, therefore, be diligent in extracting it, even although there should be inertia. Some authors, however, have thought that the delivery of the placenta ought not to be hurried while the womb does not contract, unless there should be a partial detachment of the placenta. M. Lacour has lately endeavoured to show that artificial delivery of the placenta can only have the effect of increasing inertia, and consequently to that, of producing flooding; but daily experience is opposed to this view of the subject, and the contrary opinion is generally adopted. I have no intention of repeating here what I have already said concerning the causes, signs, and general treatment of hemorrhage; but I must speak of it as one of the complications of delivery of the after-birth.

1199. I am not sure that its mechanism has been well understood; it is improperly attributed to the non-contraction of the womb, in consequence of which the blood must flow in torrents from supposed orifices that remain gaping upon the internal surface of the organ; but is it not rather occasioned by the sudden cessation of pressure upon the hypogastric vessels, whereby the blood is allowed to rush into them with great force; or upon the circumstance that the blood must in some sort accumulate mechanically in the uterine vessels, which being no longer supported, pour it into the empty space which a few moments before was occupied by the ovum—or perhaps on the fact, that together with these dispositions, there may be some irritating cause present in the cavity of the uterus itself.

Upon this hypothesis, the best means of preventing a hemorrhage would not be to rub the naval and the hypogastrium with a

spoonful of brandy or Cologne water, as advised by A. Leroy, but promptly to apply a pretty tight bandage to the belly, and place the woman with her head very low immediately after delivery.

1200. After having extracted the placenta, if the flooding continues to such a degree as to excite apprehensions relative to the welfare of the patient, provided the womb remains soft and inactive, or a sinapism applied betwixt the shoulders has been tried in vain, we may without hesitation introduce the hand into the organ. De la Motte had well remarked that this is the most certain method of putting a stop to the inertia; pressure made by the hand, and in various directions upon the hypogastrium, which is lauded as an important discovery in the *Journal des Savans* of 1722, can never be a complete substitute for this means of relief.

Injections of oxycrate, of pure vinegar or iced-water, which are recommended by Saxtorph; alcohol, and sulphuric or nitric acid diluted with water, with which Pasta advises us to cauterize the uterine vessels; the introduction of a hog's bladder, to be afterwards filled with air, water or astringent fluids, while within the womb, as proposed by MM. Rouget and Vernet, would offer much fewer advantages, and expose the patient to many more accidents, and are not so easy of application as the hand; let us add, along with MM. Pasteur and Evret, that where we have any fear lest the hand alone should not suffice, we may always introduce, along with it, a peeled lemon, or a sponge dipped in vinegar.

1201. But provided there should be no inertia, we ought to have recourse to the treatment indicated at the article on *hemorrhage in general*, that is, to revulsives, refrigerants, and even the tampon. Perhaps it would be well, where the flooding is overwhelming, to compress the aorta above the sacro-vertebral angle, while waiting until other measures might be put in practice; immediately after the birth of the child, the abdominal parietes are soft, and in many women it would not be difficult to act upon the aorta with the thumbs; so that without attaching so much importance to this measure, which has already been spoken of by Boer, Madame Lachapelle, M. Dugès, &c., as is attributed to it by MM. Trahon and Baudelocque, Jun., I would willingly have recourse to it, should an occasion present.

1202. The ergot of rye, employed by MM. Balardini, Bigeschi, Bordot, Goupil, Villeneuve, &c., is said to put a stop to inertia, to compel the womb to contract, and thus overcome the adhesions of the after-birth, expel the placenta, and thereby suspend the flooding. According to these practitioners, as the delivery of the placenta has been always found to be prompt, and never accompanied or followed by hemorrhage in women who have taken the oxytocic powder during labour, we ought to conclude that it must be of great service in cases of preternatural adhesions of the placenta, and flooding coming on after the birth of the child.

I would willingly exhibit the article in cases of adhesion, but having had no opportunities of meeting with them, I am not in possession of any facts of my own in relation to it. As to hemorrhage, some physicians have thought that they have seen it produced by the obstetrical powder; a young woman was seized with a violent flooding after the birth of the child, although I had administered to her a dose consisting of forty-five grains of ergot, during the labour, and notwithstanding, it had produced all the effect I had anticipated. I have also observed a very similar case quite recently, and am led to believe that although the ergot may be useful where the flooding is produced by inertia of the womb, it might very well be injurious in the other cases, which are far more numerous than is generally supposed.

1203. Another resource, which was first put in practice by Dr. Mojon, then by MM. Hoffman, Taroni, Lemaistre, &c., consists in injecting a cold styptic fluid into the placenta, through the umbilical vein. M. Mojon insists that previously to throwing in the injection, we should draw the blood out of the vein and its branches by exhausting with a syringe; but MM. Hoffman and Taroni have succeeded without using this precaution; the first made use of the oxycrate; the second employed brandy and water; and the last named practitioner was satisfied with injecting cold water alone. In all three of the cases, the womb, which had previously been soft and inert, contracted immediately; the placenta was expelled, and the hemorrhage was arrested; but nothing, not even the fact recently related by M. Sandras, proves that the placenta was still adherent, and that more skilful tractions exerted upon the cord might not have produced the same effect: a case related a few days ago in a public journal would even prove, were the journal and the author worthy of credence, that these injections may be wholly inefficacious.

1204. This remedy might be tried in a case of supposed adhesion, with inertia and flooding, after having vainly employed the ordinary resources, and previously to introducing the hand into the uterus. Its action must be both mechanical and chemical; it unwrinkles and swells the placenta, distends the womb, and occasions a sudden reduction of temperature, a contraction of the vascular mouths, and a more or less powerful constriction, admitting, always, that the fluid injected reaches as far as the uterine surface of the placenta. It must in fact combine a part of the advantages attributed by certain authors to injections thrown directly into the womb, or through bladders, and to the tampon, so much lauded by Leroux, without having any of the inconveniences.

1205. The operation is, besides, very simple: after having disengaged the cord, the pipe of a syringe containing six or eight ounces of very weak brandy and water, vinegar and water, or any suitable medicinal liquid, may be introduced into the vein; the

injection may be pushed up with sufficient force to make it penetrate throughout the placenta, and, to hinder it from escaping before it has produced its effect, a ligature must be thrown round the cord. The woman is soon seized with tenesmus and colic; the uterus and abdominal muscles contract; the os uteri yields, and the after-birth is promptly expelled. M. Guillon recommends that instead of all these means, we should inject some bouille, a sort of liquid cataplasm, astringent, or emollient, into the interior of the womb itself, and I see not why we might not follow his example where the intervention of the hand is not allowable.

1206. *Convulsions*, and repeated fits of syncope which come on after the birth of the child, may, like flooding, be occasioned by various causes; but the presence of the after-birth, being of itself sometimes sufficient to produce them, we should begin by delivering it in women so affected. For the remainder, we are to act as has been advised in speaking of convulsions in general.—The same is true of the simple debility or exhaustion that sometimes supervenes upon a protracted labour, or succeeds to other accidents. Provided the after-birth seems to have any influence in occasioning this state, we should make haste to extract it; nothing but the necessity of leaving the woman in a state of quiet, or the fear of bringing back a flooding, should induce us to temporize, in a case where no other accident was at the moment present.

1207. In twin pregnancy the delivery of the placenta ought not to be solicited until after the complete termination of the child-birth. As the appendages of the two children always adhere together, at least by some of their points, the one could not be extracted without detaching the other, not that this practice must inevitably occasion an inertia of the womb or bring on flooding, as has been supposed by some persons, who found the opinion upon the false notion that certain large orifices would remain, through which the blood flows into the uterine cavity, but because it is always dangerous to destroy the organic relation of the fœtus with its mother, unless it be on the point of expulsion itself. One single circumstance might permit us to depart from this rule: it is when the after-birth of the first child presents spontaneously at the orifice, before the birth of the second, and then care should be taken not to destroy the adhesions of the one that remains.

In general, the delivery of the placenta after the birth of twins, is longer in taking place than in the common case, provided it be not provoked by the accoucheur; which depends upon the uterus having rather less tendency to contract, and perhaps also, upon the fact that the size of a double placenta is necessarily greater.

In order to assist it we may take hold of one of the cords, or one of the placentæ, and draw down the two after-births, one after the other; but it is better, more prompt, and safer to twist the two

cords round each other, so as to make one string of them, and then act as in a simple case. The placenta being almost never at the same level in the organs, present at the orifice in succession, and not both at once; besides, if the contrary should happen to be the case, and their escape rendered difficult, it would be too easy to overcome such an inconvenience for it to be necessary for me to enter into any long explanations concerning it.*

1208. *After an abortion*, the delivery of the placenta is generally not so easy as it is after a labour at full term; in the first three months of pregnancy the ovum is almost always expelled whole, and there is therefore no *delivery*, properly so called; but after that period, this expulsion in mass becomes more and more rare and difficult. The foetus escapes first; its involucra remain and are not expelled until some time afterwards, sooner or later. The cervix recovering its original form and length, soon resists the necessarily feeble efforts of the uterus; the after-birth having scarcely changed its relations to the organs in which it is contained, cannot clear its orifice and fall into the vagina, but with great difficulty. On the other hand, the cord is so weak that it will bear only slight pulling, and, notwithstanding, retention of the placenta after abortion is scarcely a less serious matter than after labour at full term.

As inertia, and inversion of the womb are not to be dreaded in this case, the wisest course in my opinion is to make haste to effect delivery before the cervix has had time to close, either by pulling moderately at the cord, or by getting hold of the placenta with the fingers if possible. But when we have waited too long, or have been called too late, we are compelled to wait still longer and confine ourselves to endeavours to promote the contraction of the uterus. Should any accidents supervene, the hand could not be carried up as far as the placenta, on account of the resistance of the cervix, and the smallest extractive force would soon rupture the cord. I presume this would be the proper case to try the injections recommended by Dr. Mojon. If, however, the placenta should appear at the orifice, or could be felt with the finger, and the tractions of the hand should prove insufficient to extract it, an attempt might still be made to bring it down with the *pince à faux germes*. Otherwise, its expulsion is to be left to the natural powers, and we must take care to prevent the occurrence of accidents, or if they do occur, to combat them as soon as they make their appearance. We may resort to blood-letting, opiates, and baths,

* Let not the student be led, from the above paragraph, to expect to find two distinct placentæ in all cases; on the contrary, most of the cases of twins are accompanied with a single oblong or oval placenta, the two cords springing from the eccentric points.—In a case of triplets, under my care, there was one very long oval placenta, with the three umbilical cords in a line, distant near two inches from each other.—M.

general and local; emollient or detergent injections may be thrown into the vagina, and even into the womb, so as to neutralize the effects of putrefaction; the woman is to be confined to a strict diet, and as soon as the os uteri becomes somewhat open, such portions of the after-birth as may present themselves are to be removed.

Sometimes all these precautions are of no avail, provided the os uteri has closed soon after the escape of the fœtus, and the placenta may remain in the uterus for a longer or shorter period without putrefying; cases have been seen where the women in some sort forgot it, did not discharge it until after the lapse of one or two years, when they even became impregnated again, proceeded to their full term, and then discharged it together with the new placenta. But the placenta and membranes are most commonly expelled either piecemeal or in one mass, in the course of the first week after the miscarriage, or they are gradually discharged along with the lochia, or by means of injections. It will be understood, further, that these difficulties become more frequent and numerous in proportion as the abortion takes place nearer to the middle period of gestation; that they are, on the contrary, less severe, and more easy to overcome, the nearer they occur to the natural period of parturition.

ARTICLE II.

MANAGEMENT OF THE CHILD.

The management of the child varies according to the state in which it happens to be at birth, and accordingly as it is healthy or in a diseased state.

SECTION 1.

Of the Fœtus in a Healthy State.

When the child is born alive and in good health, which is known by its cries and movements, after placing it properly between the mother's limbs, the cord is the only thing that requires the accoucheur's attention at first.

As soon as the child passes from the vulva, it should be laid crosswise, upon its side, with the face turned towards the foot of the bed, between the woman's thighs. In this situation it can breathe and run no risk of being suffocated by the matters flowing from the vagina. Should the cord be found coiled round the body,

it must be disengaged ; it should be freed from any portions of the membranes that it may have brought along with it, and also from the mucus which sometimes obstructs the mouth or throat ; and lastly, we proceed to tie and cut the umbilical cord.

SECTION 2.

On Tying and Cutting the Cord.

1209. In the time of Hippocrates the cord was not cut until the placenta was delivered. If the placenta was slow in coming away, the child was placed upon a pile of wool, or on a leather bottle with a small hole in it, so that by the gradual subsidence of the skin or pile of wool, the weight of the child might react by almost insensible degrees upon the placenta, and extract it without any kind of violence. Deventer thinks the placenta should be extracted previously to dividing the cord ; Dionis followed sometimes one plan, sometimes another. Where the secundines required only gentle pulling to extract them, he did not cut the cord until after they came away, and pursued an opposite practice when he found it necessary to introduce the hand in search of the after-birth. Since the time of Levret it has been established as a general rule, among accoucheurs, to separate the child from the mother as soon as it has passed through the vulva, and that it is never necessary to wait for the expulsion of the fœtal appendages. At first view the conduct of the ancients appears to be more rational and more physiological than that of the moderns ; it seems that the placenta ought immediately to follow the fœtus, or at least be separated from the uterus before the cord can be prudently cut ; that before it is divided, the circulation ought to be permitted gradually to take on its new type, which soon becomes similar to that of the adult ; but in reality it is not perceived that the present mode of practice produces the least inconvenience to the fœtus, and is certainly better for the mother. It would be in vain to object that this conduct is not natural, for it is followed by most of the animals themselves, who tear off the umbilical cords of their young as they escape from the vulva. Not only should we not wait until the placenta is delivered, but it is of no use to wait until the pulsations have ceased, before we cut the cord, as recommended by Denman and A. Leroy. Neither is there a general agreement as to whether the cord should be cut or tied first.

1210. If we begin by applying the ligature, we have to do it under the bedclothes ; and on the lying-in bed, it is not so easy to examine the umbilicus, and we deprive ourselves of the advantage of disengorging the viscera of the blood with which they are sometimes overloaded. In fine, as soon as respiration is esta-

blished, the placental circulation becomes completely useless. If we cut the cord before we tie it, we are at liberty to carry the fœtus to any convenient place, attend to it if it be not well, and examine it with all desirable attention. However, it must be confessed that if the child present nothing peculiar as to its condition, one of these modes of proceeding is scarcely preferable to the other, and that each practitioner is at liberty to adopt the one that pleases him best, without its having any influence upon the result of his practice.

1211. The place where the cord is to be divided is altogether a matter of choice. If it be cut at the distance of four or five inches from the navel instead of nearer to or farther from the placenta, it is done in order that what is left of the cord may not be troublesome by its quantity, and may admit of the ligature being applied at a certain distance from the abdomen. Any cutting instrument may be made use of, and the scissors are used only because they are rather more convenient than a bistoury. Although a rusty instrument cannot possibly occasion any redoubtable accident, such as tetanus, as A. Leroy supposed, it is nevertheless best to make use of such only in cases where sharper ones cannot be obtained; on the other hand, there could be no advantage obtained by tearing off, bruising, or sawing of the cord, as some authors have recommended, with the view of more closely imitating the quadrupeds, even although we intend to dispense with the use of a ligature.

1212. The cord being cut, it should be squeezed between the fore finger and thumb, if there should be any disposition in it to bleed, the other three fingers take hold of the breech; the other hand is placed under the shoulders and nape of the child's neck, which is thus removed from the lying-in bed, and commonly deposited on the nurse's lap; there it can be examined at leisure. Previously to putting on the ligature, we ascertain that no loop of intestine has got out through the umbilicus, that there is not an omphalocele. Should such a tumour exist, we ought to try to reduce it, or at least not to include it within the ligature we are about to place on the cord, as happened to some children under the notice of M. Sabatier and Madame Boivin. In the time of Aristotle the midwives were in the habit of forcing the blood contained in the cord into the belly of the fœtus before they tied it, and pretended by means of this practice, which has been revived at the commencement of the present century, to restore strength and vigour to feeble children. Some again have maintained, along with Rhazes and the other Arabian physicians, the Abbe Bizance and M. Sarton, that this blood ought to be very carefully squeezed out instead of forcing it in; that it is particularly necessary to evacuate the kind of serosity or lymph, more or less of which is contained in the cord, either by covering it with punctures, or

squeezing it with the fingers, either naked or covered with a piece of rag, for they attributed to the retention of these matters the property of producing the small-pox, crusts on the head, tetanus, and convulsions. Levret, also, thinks that by squeezing out these humours we may prevent the occurrence of infantile jaundice, that at least which he compares to ecchymosis; but this opinion, which M. Désormeaux seems to partake in some measure, cannot be maintained, and scarcely deserves to be discussed.

In my opinion it is of very little consequence whether we take this precaution or omit it: if it is sometimes of use, it is so because it admits of the ligature being applied upon the vessels more exactly, without its being so easy to cut them off, and admits of their drying sooner, and without putrefaction.

1213. As to the ligature itself, De la Motte advises us to apply it at the distance of one inch, Deventer, Levret, and the moderns at the distance of two fingers breadth, others at three, four, five, six, and even twelve inches from the abdomen. Some persons have recommended the application of two, and in such a way that the one nearest the abdomen should not be so tight as the other. Sometimes it has been recommended to draw it very tightly, at others very loosely. One person is content with a single turn and a single knot; another thinks there should be two turns and a double knot; a third, like Plenck and M. Désormeaux, makes first one turn and one knot and then bends the cord into a noose to tie another knot upon it. Some would not dare to use any thing except tape, whereas, wiser persons make use of what they can find at hand; but in fact, is this ligature really necessary?

No animal can have recourse to it. At the period of the conquest of Brazil travelers reported that the aborigines merely chewed or tore off the cord with their teeth, and that they did not tie it up. If a careful attention be paid to what happens after an ordinary birth, it will be seen that the pulsations grow weaker and soon disappear in the cord, beginning at the placenta, and that after a few minutes it may be cut without being followed by the least hemorrhage. This remarkable phenomenon which is attributed to the change of direction of the iliac arteries, and to the difficulty experienced by the blood in passing into the aorta through the *ductus arteriosus*, and into the cord through the umbilical arteries, always takes place where every thing occurs in a natural and regular order, but in reality depends upon the circumstance that the attractive force exerted by the placenta upon the blood, is replaced by that of the respiratory organ, and that the after-birth is no longer any thing more than an inert substance, without vitality, which is abandoned by the blood, as it abandons a gangrenous or asphyxiated limb.

It is so independent of any mechanical change in the arrangement of the vessels, that if, as was done by Vesalius, the belly of

an animal at the full term of gestation be opened, the pulsations of the cord are seen to continue as long as the *foetus* continues to live without respiring, and on the contrary, to cease as soon as the air enters freely into the lungs. Beclard has seen the same thing in the dog. I once received a human *foetus*, at the sixth month of pregnancy, enclosed within its membranes. The umbilical arteries continued to beat strongly as long as the membranes were unruptured; but they fell into inertia as soon as the lungs and chest, upon coming in contact with the air, attempted to perform some respiratory movements. And do we not every day see the blood flow or stop spontaneously in the same child, accordingly as the respiration is free or embarrassed?

1214. Whatever may be the fate of the explanation, it is not the less true, that if the cord were left to itself without any ligature, it would not expose the *foetus* to any hemorrhage, or any accident, even although it should be cut off clean, and not contused or torn. However, as the contrary may happen, as a mere compression of the chest, or an embarrassed state of the function of any organ suffices to disorder the general circulation and enable the blood again to pass through the umbilical ring; as cases are reported of children who have died from bleeding in consequence of the cord being not well secured; and lastly, as there is no danger occasioned by the application of a ligature, as it presents no difficulty, we are not authorized to dispense with it; we should even be culpable to neglect it. Although the observations of Fautoni and Schultz prove that it is not indispensable, those of Daniel prove, that it would not always be safe to omit it even after a rupture of the cord; and the cautery, made use of in Turkey, will always be less safe and more troublesome.

Further, whether tied or not, the cord constantly separates from the abdomen at the same place, that is to say, at the spot where it joins the skin, and consequently, a few lines beyond the surface of the belly; and I do not think it my duty to combat the old women's notion, which was derived from the physiology of the ancients, and which requires that the cord should be cut very near the umbilicus if the child is a girl, and very far from the abdomen if it is a boy, such a mode of cutting it being supposed to exert a great influence upon the development of the organs of copulation!

1215. I always make one turn* of the ligature, which I tie with

* A majority of the Philadelphia accoucheurs, in tying the navel cord, pass two strong ligatures each twice around it, securing them with two knots; the one an inch and a half, and the other two inches and a half from the abdomen, and divide it between the two with a pair of sharp scissors. This is a cleanly practice, in all cases, and prudent, if not essential in *twins*.—H.

a single knot sufficiently hard to close the vessels; I then carry the two ends behind, cross them and bring them back again in front, where they are secured by a double knot which is tied somewhat more firmly. I pursue this method because it is very simple, and because I have never seen it followed by any accident. But if the cord were a very large one, I would willingly, for the sake of greater security, imitate the conduct of M. Désormeaux and Plenck, that is to say, that after tying the first knot, I would make a loop of the cord, and secure it in the second turn of the ligature. Besides this ligature, some practitioners apply one to the placental end of the cord, to prevent, as they say, any hemorrhage from taking place from the woman. But what I have said concerning the utero-placental vascular system, proves that this is an unnecessary precaution. It can be of no use except in twin cases, and even there, to make it necessary, the vessels of one placenta ought to communicate directly with those of the other, as appears to have been the case in two instances met with by M. Mancel, but which must be a very rare occurrence.

§ II. OF CLEANSING THE CHILD.

1216. Without undertaking to decide whether our first parents took the trouble of removing the unctuous matter which covers and soils the skin of the fœtus at birth; without recurring to the question whether, as is supposed by M. Richerand and most of the modern physiologists, this substance is a mere result of the sebaceous secretion, rather than a deposit of some principle contained in the liquor amnii, as is supposed by the chemical physicians in accordance with the sentiments of M. Vauquelin, I will say, notwithstanding the ideas of Gaultier de Claubry, that none but beneficial effects can follow its removal. If it were the intention of nature to retain it upon the surface, why would the goat, the cow, and so many other animals lick their young so carefully and sometimes so rudely as soon as they are born! I know that no very serious inconvenience would follow should it be left adhering to the surface, and that it would come off in a few days by sticking to the clothes, or with the epidermis to which it adheres, and which always desquamates within the first few weeks; lastly, I do not believe its presence can have any great influence in producing scabs on the head, of *crusta lactea* of the head in children at the breast, or crusts on other parts of the body; nor, consequently, that it is absolutely necessary to remove it with scrupulous minuteness, even to the very smallest portion; but I think that none of it ought to be left except in certain spots from which it cannot be readily got off.

Where nothing is made use of but a napkin to wipe it off, some portions always remain adhering to the skin, unless it is

rubbed so long and so violently as to be sometimes dangerous ; nor can we succeed much better by immersing the fœtus in a warm bath, unless it be composed of a mucilaginous or saponaceous fluid.

It should be first diluted and thinned with a little fresh butter or oil, mucilage, or any kind of grease, or what is still better, the yolk of an egg, which renders it miscible with water. A weak solution of soap and water might also be made use of very properly, but the other substances are preferable. This ceruminous substance is met with in greatest abundance at the principal bends of the limbs, and on the head and neck ; when it is well detached from the body, it should be gently wiped with a dry napkin ; after which, in order to finish the cleansing of the child we may first merely rub its skin with a soft sponge dipped in warm water, or weak wine and water, and then again with the sponge squeezed dry, to clean off any blood or other matter adhering to it.

Some persons think the whole child should be plunged into a bath, and I do not see why the accoucheur should refuse this little gratification to the parents when they desire to have it done ; if I generally neglect it, it is because it takes up too much time, and assuredly does not deserve to be made of so much consequence as is done by some accoucheurs.

1217. It is difficult to conceive how certain grave authors can defend the conduct of the ancient people of Germany, Britain, Scythia and Greenland, and recommend the Lacedæmonian custom of plunging the fœtus into cold water or ice-water, or even to roll it in the snow immediately after its birth, as appears to be still the practice in some remote districts of the vast empire of Russia. The vigour and the robust constitution of those people depended upon their diet and the exercises to which they were accustomed. If they had among them no weak and delicate children, that may be accounted for, not by saying that the cold bath gives strength and health to weakly children, but that those that were weakly at first soon died, and that none remained but such as were endowed with more vigorous constitutions. This practice was quite a natural test among a people who desired to have in their republic none but strong citizens, and looked upon infirm men as more troublesome than useful ; but in our present state of civilization the most robust men are not always those who perform the most important parts in the state ; it is no longer allowable to be careless of the life of any individual, and every child, whether delicate or vigorous, has an equal right to the protection of its parents and of society in general.

The fœtus has enough to do to bear the intemperature of the atmosphere ; and can any thing be more absurd than to wish to make it pass at once from a temperature of 32° of Reaumur to

some degrees below zero? A transition so sudden as this in a being so frail—is it natural? Even although it should be effected by degrees, as Rousseau wished, it would nevertheless be dangerous and wrong.

1218. Medicated, alcoholic, or strengthening baths seem to me to deserve the same reprobation, as a general rule: if they are strong they deprive the skin of its suppleness, interfere with the expansive movement of the fluids, and may give rise to the most serious accidents; if weak, they at least do no good, and I should not make use of them except where the *fœtus* might be excited in a general manner, so as to communicate a greater degree of activity to its languid functions. Thus, except under particular indications, lotions and baths of plain warm water are the only ones that prudence permits us to recommend.

§ III. OF DRESSING THE CHILD.

1219. The *fœtus* being washed, cleaned and wiped dry, still requires some attention; the accoucheur should direct its first dressing; he should at least superintend the application of the belly band and the dressing of the cord.

The form of this compress, in itself considered, is of little consequence; Baudelocque directs it to be made double, and that a pretty deep cut of a half moon shape should be made in the folded edge with the scissors; that after splitting one of the halves from the hole quite out to the end, the root of the cord should be lodged in the space between; that the part not split should remain below, and the two halves of the divided portion should be turned over and crossed in front! There is another method. Let the compress be placed at the upper and left side of the abdomen, rather than at the right, on account of the presence of the liver; a second compress, soft and of a square shape, covers the first; a band as wide as three or four fingers, and long enough to go once and a half round the belly, keeps the whole in place; this band is fastened at the side rather than at the middle of the belly, with a pin, which is far from being so dangerous as some persons have supposed, or it may be secured with a needle and thread. If drawn too tightly it would do harm, if too loose, it would slip off and do no good. This little apparatus, the object of which is to prevent the cord from being pulled or stretched, and from sticking to the skin, ought to be continued or reapplied until the cord drops off. It may even be continued for some days, some weeks, or months afterwards, provided the navel projects too much, or there is any danger of an omphalocele taking place. The cord generally separates from the navel about the fifth day; but in some children it takes place as early as the second, while in others it does not happen until the ninth or tenth day. It begins to dry at its loose end, as has been correctly observed by M. Billard; the gelatin

which it contains contracts upon the vessels, which are soon somewhat strangulated by it, as far as the umbilical ring, and not by the epidermis, as M. Gardien supposed. Being reduced to a mere pedicle which grows smaller and smaller, the vessels soon separate from the living parts, so that the gangrene of which Haller speaks, the contraction indicated by Gardien, the eliminative inflammation observed by Beclard, Chaussier, and M. Orfila, as well as the kind of putrefaction noticed by M. Denis, are merely accidental phenomena, and not the cause of the fall of the cord. When a small wound is left after the separation of the cord, it generally heals spontaneously in from eight to twelve days. All the ointments and waters recommended by the good women to force it to close sooner are of no use, and might even produce an opposite effect. It is sufficient to cover it with a piece of fine dry linen, or to sprinkle it over with a little flour or powder of lycopodium.

1220. Previously to wrapping up the navel string, it was formerly the custom to begin to dress the child and cover the head, arms and breast. Thanks to the elegant pen of Rousseau, it is rarely necessary for us at the present day to combat the employment of those absurd swaddling bands, which render a new-born infant an immovable mass, a sort of doll which could be taken hold of by the feet and lifted up stiff. The reform upon this subject is carried so far in England, that instead of the barra-coat they make use of a long frock, a sort of sac of fine wool stuff, which serves for the dress of the child. In France, they also put a shirt, or small woollen jacket, provided with a soft chemisette, which is fastened behind with pins; it is then wrapped in a linen barra and another made of wool or cotton. These barras come up as high as the axillæ, and go once and a half round the body, and cross in front all the way down; the end is then folded up so as to reach quite to the upper part of the breast, and the corners are carried round behind, to the back, where they are also fastened with pins.

However, all these matters belong rather to the women, and particularly the nurses, than to the physician. Provided that the child is comfortable, free in its motions, the dress soft and warm, it is of small consequence what shall be its form, nature or arrangement; every thing over and above these points should be left to the taste or caprice of the family or assistants.

SECTION 3.

Of the Fœtus in a state of Disease.

The fœtus may be born weak, or even in a state of apparent death; the treatment it shall receive under these circumstances

should vary according to the danger and the nature of the accident which compromises its life.

§ I. OF ASPHYXIA.

If the child is only weak without being actually sick, it should be treated in the way that has already been directed; only we should sooner attend to putting the finger in the mouth so as to cleanse it from any mucus contained in it; great care is to be taken to avoid cold; a little wine may be added to the water to be used in washing it, and nothing is to be done that might in any way whatever interfere with the freedom of its respiration.

But the weakness may be carried to the extreme; sometimes the fœtus neither cries nor respire, its skin is pale; the circulation is languid, the heart scarcely beats; and but for the heat which remains, and the obscure motion of the umbilical arteries and heart, the death of the child would be evident.

1221. This is the state which is called *asphyxia of new born children*, which M. Gardien prefers to denominate *syncope*, and which others have denominated *anemia*; but which in fact differs from those three morbid states in a great many respects, and which, rigorously speaking, are much more nearly allied to the latter than to the two former.

It is met with particularly after very precipitate delivery, where the child has been turned, when it is born before the full term, where there has been a flooding during labour or several days before it, especially that kind of flooding which is caused by implantation of the placenta over the os uteri, or that which comes direct from the vessels of the cord.

Its cause therefore is, on the one hand, a deficiency of blood, which does not pass through the brain and lungs in sufficient quantities to keep those organs in a state of action; on the other, the want of incitation of the inspiratory muscles, and perhaps, also, in some cases, the presence of too great a quantity of mucus, or water of the amnios in the trachea, as supposed by Heroldt and Schéele; M. Désormeaux seems to agree with Frêteau, that the compression of the cord may also occasion it, by closing the passage for the blood in the vein, whilst it leaves the arteries more or less permeable; but I have elsewhere shown what ought to be thought of this view of the subject.

Upon the whole, it seems to me that asphyxia of new born children ought to be attributed to the affection suffered by the blood in the last moments of the labour, its placental modification, and its having ceased to be subjected to that sort of internal respiration which under ordinary circumstances, is kept up, until the real respiration becomes positively established.

1222. *Treatment.* The first thing to be done is to remove the viscid mucus from the mouth by means of the finger, or with a

brush either dry, or dipped in a solution of common salt; there is no reason to believe that it is either safe or useful to turn the fœtus with the face downwards to force the matters contained in the trachea to escape therefrom, nor to suck them out into a tube as Heroldt and Schéele state that they have done. Where there is reason to believe that the placenta still maintains a part of its natural relations with the womb, and especially where there is still some tremour, some pulsation in the cord, we may follow the advice of Levret, Smellie, Fréteau, M. Piet, Chaussier, &c., not to cut it too soon; but if the womb be well contracted, if the adhesions of the placenta be evidently destroyed, it would be better to separate the fœtus at once from its mother. The fact related by A. Petit, wherein he saw the child in some measure die and revive again accordingly as the cord was compressed or free, to command our entire belief, would require a fuller detail of all the accompanying circumstances. Supposing that the secundines are either wholly expelled, or on the point of being expelled, and that there should be still some pulsations in the cord, I should not object to keeping them for some time in warm wine and water, as again recommended even in our own day by many authors, as MM. Beauchesne and Dorthal among others; but in other cases I cannot perceive any advantages in acting thus. As it is important for the fœtus to preserve what little blood it has, the cord should be tied previously to cutting it off; the child is to be immediately taken out of the mother's sight; it should be taken near a good fire, or it may be plunged up to the axillæ in a warm bath, rendered somewhat exciting by the addition of a little wine or brandy; we should give it slight shocks by slapping it with the flat of the fingers upon the breast, the back or the breech; the cord should also be gently pulled in such a way as to remove the diaphragm a little. Van Swieten speaks of midwives who applied the mouth to the left nipple of the child, and derived great advantages from suction performed on this or other parts of its body. Instead of the mouth, a cup might be made use of. This practice, which was reinstated by Saccombe, M. Désormeaux thinks may be of some use, by exciting the action of the muscles; but it cannot produce, as is pretended, a real mechanical dilatation of the chest. The temples, the nostrils, the forehead, the root of the neck, and the spine, ought to be rubbed with the fingers dipped in cologne water, alcohol, &c., or with a pretty stiff dry brush; the inside of the mouth and nose are to be stimulated by the introduction of vinegar, brandy, or some other irritating liquor, or merely with the barbs of a dry feather. I have, in imitation of M. Désormeaux, advantageously employed a mouthful of spirituous liquor, held a few moments in the mouth and then spirted with force, in the form of a *douche*, or abluion over the breast of the child: the smoke of burnt linen or paper introduced into the rectum has been beneficially employed

in some cases, some onion or garlic introduced into the anus, the mouth, or the nose, produce nearly the same effect, and are not so dangerous as ammonia or radical vinegar, which promptly act as caustics if not largely diluted with water. The belly and thorax should be simultaneously and properly pressed so as to try to induce the diaphragm to contract; and during all these processes the fœtus should be always kept very warm, for without this precaution the action of all the other means will generally be inefficacious. We should persevere with them for a long time, and not get tired, and redouble our patience as soon as the least sign of life becomes manifest: sometimes the efforts of the accoucheur are not crowned with success until after they have been continued half an hour, an hour, or even two hours, and cases are not wanting where children, after being several hours abandoned as dead have come to life, without any other succour than the temperature of the place where they were deposited.

1223. When these different means prove ineffectual, recourse is to be had to inflating the lungs, which may be done either through a quill-barrel, a female-catheter, or any kind of canula introduced into the mouth and nostrils, or by merely blowing with the mouth directly into the air-passages. The laryngeal tube invented by Chaussier, having the advantage of pretty exactly filling the glottis when introduced into it, is better than the straight canula of Heroldt; but a simple gum-elastic catheter, an instrument which may be got anywhere, is almost as convenient; it is introduced *through the mouth*, as far as the bottom of the pharynx; then, while it is passed onwards, the point of it may be bent with the little finger, so as to compel it to enter into the larynx rather than the œsophagus; when fixed right, the nostrils and mouth of the fœtus are closed, and the inflation commenced. However, if it should be admitted that the experiments tried by Winslow, Heroldt, Schéele, Viborg, Schmidt and Beclard, incontestably prove that the liquor amnii penetrates during intra-uterine life as far as the bronchia, it would perhaps be useful to free the trachea from it by suction or otherwise, previously to trying the effects of inflation; but there is still too much uncertainty upon this point for it to serve as a basis for any practice whatever.

1224. Curry, Chaussier, and others, had at first thought that by blowing into the mouth none but vitiated or more or less changed air was forced into the lungs of the fœtus, and that it would be better to make use of a bellows; but it was soon found that all these precautions were useless, that air, slightly warmed in the lungs of an adult, and charged with a gentle humidity, would be more congenial to the lungs of the child than a drier and colder air. Besides, Heroldt and others have proved, that the gas given out by expiration, contains only one hundredth less of oxygen than atmospheric air.

As it is important that the air should enter the lungs and not the alimentary canal, an assistant ought to press his hand against the larynx, so as to keep it against the cervical vertebra, and flatten the œsophagus as much as possible.

1225. We should blow at first very gently. When the lungs are sufficiently filled to lower the diaphragm and raise the sides of the thorax, as is done in a natural inspiration, we must stop, and gently compress the abdomen and breast in imitation of the act of expiration. We then begin again in the same manner, and thus establish a sort of artificial respiration, the advantages of which have certainly been exaggerated by some authors: M. Désormeaux has been but imperfectly satisfied with it, and in my hands it has succeeded in but a small number of cases, and (according to the researches of M. Leroy d'Etiolles) it is really dangerous unless managed with very great care.

In fact, it is not the action of the lungs, but that of the respiratory muscles that ought to be first put in play. But as the very reverse takes place in inflation, it follows, according to M. Leroy, that the air generally stops in the large branches of the bronchia, and that we can rarely succeed in forcing it into the air-cells, without the risk of producing an emphysema, which of itself is sufficient to occasion the death of the individual.

The operation of tracheotomy, proposed, in despair of any thing better, by M. Heroldt, as it is very dangerous in itself considered, offers no advantages superior to simple inflation, and ought to be proscribed.

1226. Electricity and galvanism, which have been recommended under these circumstances by Grève, Behrends, Boer, M. Gardien, &c., might also be of great service either as a principal or accessory cause in the treatment of the asphyxia of new-born children. The current should be directed through the breast, or from the mouth to the anus. I must, notwithstanding, confess that I have twice tried it without success, although I made use of a double battery of twenty-one metallic plates, the action of which was very strong. The electro-puncture, which was tried by M. Leroy on animals, might perhaps be more efficacious, by permitting it to act directly upon the diaphragm; but, so far as I know, it has never been applied to the human fœtus.

If we are to succeed, the pulsations of the heart and cord reappear by degrees, the muscles gradually recover their natural firmness, the skin becomes slightly coloured, the heat returns, and then some respiratory movements, feeble and irregular at first, then more and more decided, soon make their appearance; cries are soon heard, and the child is saved. It would, however, be imprudent to cry out victory too soon; I twice succeeded in restoring the motions of the heart and the respiration

for more than three hours, by means of inflation and galvanism, in two children, which I nevertheless was at length compelled to abandon.*

§ II. OF THE APOPLECTIC STATE.

1227. Instead of coming into the world pale, anemic, or exsanguious, the child is sometimes born in quite a contrary condition; its skin is of a bluish red or liver colour, of various degrees of intensity, especially on the face, and appears as if thickened. All the organs seem to be the seat of a general congestion; the limbs are soft and motionless; the circulation is suspended, either wholly or in part, in addition to which, all the other signs just now indicated are found to be present.

It should also be understood that the disease may exhibit itself under various degrees of intensity, and produce various changes in the interior of the body. Upon opening the dead bodies of such children, fluid blood is often found extravasated between the meninges or in the very substance of the brain. In other cases, and that most frequently, the blood is not found to have escaped from the vessels, or only forms slight ecchymoses in different parts; but it is in excess in all the organs, which are engorged, and, as it were, soaked in it.

The apoplectic state is met with, especially in strong children, after long and difficult labours, the application of the forceps, and pelvis labours, either spontaneous or artificial; where the child has remained for several hours under the influence of the uterine contractions after the discharge of the waters; where it has presented in a bad position; where it is too large to pass with ease through the various passages; where a loop of the cord stricture its neck, or is itself in any way compressed, and particularly where any of these accidents occur coincidently with a previous plethoric state.

Its immediate cause is the compression or engorgement of the brain; which, however, does not prevent a want of the revivification of the blood from being an occasional cause of it, as well as of asphyxia; and M. Gardien, while opposing the sentiments of M. Chambon, Courraut, and Capuron, is certainly wrong in maintaining that compression of the cord is as incapable of producing the apoplectic state as it is capable of easily producing asphyxia.

* There are a great many real resources for the recovery of the child, but they are often applied without success, because they are persevered in after the signs of death are complete. In general, it is safe to abandon all attempts to resuscitate, if there be no audible pulsation of the heart, no sensible beating of the umbilical vessels close to the belly—if the child be without muscular tone or resistance—and especially if the sphincterian contraction is gone.—But no truce should be allowed while there remains the least sign of muscular action in any part of the body.—M.

1228. When a child is born in this state we should make haste to disengage its vascular system; by acting soon where there is no effusion, the alarming symptoms may generally be soon dissipated. Under the opposite circumstances, death is commonly inevitable; but as has been remarked by M. Désormeaux, inasmuch as it is impossible, *à priori*, to distinguish a simple congestion from an encephalic hemorrhage, the accoucheur would be reprehensible who should fail, in any case, to bestow upon the child the same care as if the affection were known to be less serious.

If the accident have been occasioned by compression by the cord upon the jugular vein, the turns should be quickly cast off, or cut, provided the fœtus cannot be otherwise freed from their injurious effects. In other cases it would be equally dangerous to wait for the child to cry before cutting the cord, or to amuse one's-self with immersing the placenta in a warm liquid. The section of the cord is the first and chief remedy to be resorted to. The ligature is not to be applied until after the disappearance of every bad symptom, because the advantage of this section is, that it gives free issue to the blood. To promote the escape of this fluid, it is sometimes requisite gently to press upon the breast, the abdomen, and the cord itself. As the blood flows, the child seems to revive; the livid colour of the lips is soon replaced by a purplish or rosy hue; the parts about the mouth and nose, the rest of the face, and the whole surface of the body, clear up by degrees; the respiration soon becomes established, and in a few minutes the danger has wholly disappeared; but the circulation is sometimes so much enfeebled and obscure that no blood flows from the umbilicus. In such cases we are obliged to resort to the remedies recommended for asphyxia, that is to say, to frictions, stimulating baths, inflation, electricity, &c.; and as it is absolutely necessary for the child to lose blood, provided it be impossible to obtain any from the cord, a leech should be applied behind each ear to disengage the brain.

1229. When the integuments have recovered their natural colour, the circulation has returned to its natural state, the respiration is no longer doubtful, and the fœtus cries and moves freely; the bleeding must be stopped, provided it should not have stopped of itself. After this we proceed as if the child had been born well. On the contrary, should there still remain some obstruction in the pulmonary and cerebral functions, as has too frequently been noticed, especially where we have been unable to procure a sufficient quantity of blood, leeches ought again to be applied, and are almost the only agents upon which we can place any reliance, in cases where congestion, a sort of secondary apoplexy, does not come on until twelve, twenty-four, or forty-eight hours, or even, as has happened, until three or four days after its birth.

§ III. OF SOME OTHER MORBID STATES OF THE NEW-BORN CHILD.

1230. It is not a part of my subject here to treat of the contusions, wounds, luxations, and fractures which take place in certain difficult labours; neither have I occasion to speak of what is called tongue-tied, adhesions of the tongue, occlusion of the palpebræ or lips, imperforation of the urethra, vagina or anus, of jaundice, induration of the cellular tissue, nor any of the faulty conformations or numerous diseases to which the infant is subject; but I cannot pass over in silence the deformity of the head and some other accidents which depend directly upon the compression of the head during its passage through the straits.

1231. The *depression* of the parietal or frontal bone with or without fracture, has been several times observed at the Maternité at Paris by Chaussier, M. Dugès, and Madame Lachapelle; there is reason to fear its occurrence when the head rests against the sacro-vertebral angle, and is for a long time subjected to violent efforts, when the strait is *reniform*, and when a pretty large head is forced to mould itself to the form of the pelvis through which it passes.

If the fracture or depression of the bones is not accompanied with extravasation, nature ordinarily succeeds in restoring every thing to its proper condition, and performs the cure herself; otherwise death is the common consequence, or, at least, there ensues stupor and a very great tendency to convulsions.

1232. By moulding itself according to the contracted straits, the head may be elongated without its bones being depressed or fractured, but in such a way that their edges cross and over-ride one another, more or less; in these cases they pretty often recover their natural position after the delivery; but they may also continue to over-ride, as occurred in one case under my own notice, and thus constitute a perpetual cause of disease, particularly of convulsive affections.

However, in this, as in the preceding cases, art can do nothing, and we are obliged to trust to the powers of nature.

1233. A more common, and fortunately less serious accident than these, is a sort of subcutaneous effusion, a *swelling of the hairy-scalp*, which is almost always met with, but in different degrees, when the head has traversed the pelvic canal slowly and with difficulty; this tumour is generally found on that part of the cranium which occupied the open space in the pelvis during the labour; or one of the points that was longest and most forcibly pressed against the sacro-vertebral angle or pubis; it is composed in some cases of reddish serum, in some of pure blood, either fluid or coagulated, in others of a mixture of these fluids, and is of various size, from that of a nut up to that of a hen's egg.

It may be diffused or circumscribed, and it may be fluctuating,

though generally elastic and dough-like, and commonly disappears without any assistance ; sometimes, however, it suppurates and is converted into a real abscess, which may end in denudation and necrosis of the cranial bones.

Being soft and compressible in the centre, and firmer and more elevated about the edges, it has, on more than one occasion, been mistaken for a fracture or depression of the bones, and excited useless alarm. But since J. L. Petit, Ledran and Levret have called attention to this sort of mistakes, they have become more and more rare.

1234. When the tumour is of a small size, it should be left to itself, and disappears in the course of three or four days, leaving behind it only a simple ecchymosis ; but its resolution may, and indeed should be facilitated, by keeping it covered with compresses dipped in salt water, red wine, or brandy and water, some *eau-blanche* or other medicine of the same kind. Should it be fluctuating and not very painful, it should nevertheless be resolved if possible ; if the means above indicated do not suffice, they might be replaced by a solution of half an ounce of hydrochlorate of ammonia in a pint of red wine ; this liquor, which is recommended by Siebold, and frequently employed by M. Boyer for bloody tumours of the knee, has many times succeeded in dispersing collections which it had seemed indispensably necessary to open.

However, should it not produce the effect expected from it, and the fluctuation increase, recourse must be had to the bistoury ; and in such a case we ought not to wait too long, which would admit of the skin becoming more extensively detached, and much thinner. The wound should be dressed with lint, cerate, or cataplasms, that is to say, as we would dress an abscess or any sanguine collection of a common kind, and the wound generally heals very speedily.

ARTICLE III.

MANAGEMENT OF THE LYING-IN WOMAN.

1235. The accoucheur being now satisfied as to the condition of the child and delivery of the after-birth, has nothing further to do except to attend to the woman herself. After ascertaining that the womb is well contracted, and every thing in a natural state, he cleanses (or orders it done) the vulva, the thighs, and all the parts that have been soiled with blood, waters, or other substances during the labour. Some warm water, either simple or mixed with a little wine, provided the parts are soft and relaxed, is, with

TABLE V.

Table showing the Mortality of Lying-in Women in different Countries and at different Periods; from the Registers of the Dublin Lying-in Hospital, MM. DE CHATEAU-NEUF, DUGES, &c.

	Years.	Labours	Deaths.	Years.	Labours	Deaths.
DUBLIN LYING-IN HOSPITAL.	1757	55	1	1791	1603	25
	1758	454	8	1792	1631	10
	1759	406	5	1793	1747	19
	1760	556	4	1794	1543	20
	1761	521	9	1795	1503	7
	1762	533	6	1796	1621	10
	1763	488	9	1797	1712	13
	1764	588	12	1798	1604	8
	1765	533	6	1799	1537	10
	1766	581	3	1800	1837	18
	1767	664	11	1801	1725	30
	1768	655	16	1802	1985	26
	1769	642	8	1803	2028	44
	1770	970	8	1804	1915	16
	1771	695	5	1805	2220	12
	1772	704	4	1806	2406	23
	1773	694	13	1807	2511	12
	1774	681	21	1808	2665	13
	1775	728	5	1809	2889	21
	1776	802	7	1810	2854	27
	1777	835	7	1811	2561	24
	1778	927	10	1812	2676	43
	1779	1011	8	1813	2484	62
	1780	910	5	1814	2508	25
	1781	1027	6	1815	3075	17
	1782	990	6	1816	3314	18
	1783	1167	15	1817	3473	32
	1784	1261	11	1818	3539	56
	1785	1292	8	1819	3197	54
	1786	1351	8	1820	2458	50
	1787	1347	10	1821	2849	22
	1788	1469	23	1822	2675	12
	1789	1435	25	1823	2584	59
	1790	1546	12			
M. DUGES, at the Maternité of Paris.	1799	1364	100	1809	1795	66
	1800	1155	120	1810	1814	71
	1801	1209	25	1811	2395	108
	1802	1496	13	1814	2384	127
	1803	1632	108	1815	2346	149
	1804	1662	59	1816	2422	46
	1805	1564	60	1817	2800	63
	1806	1625	114	1818	2411	152
	1807	1691	72	1819	1528	187
	1808	1690	57			
M. DE CHATEAU-NEUF, at Paris.	1816	9,683	81	1819	11,580	100
	1817	10,528	90	1820	11,634	228
	1818	11,662	167	1821	11,481	223
At	{ Wassenda, in Sweden, 1 death in 62			{ Hotel-Dieu, Paris, . . . 1 in 15		
	{ Berlin, 109 in 10,000			{ London, in 30 years, 820 in 10,000		
	{ British Hospital . . . 1 in 50			{ Strasburgh, 1 in 100		
	{ Manchester, 1 in 128			{ Petersburg, 7 in 1000		

the addition of a piece of sponge, all that is necessary in this little operation.

We next *change* the woman's clothes; the *chemise* may be long, soft and wide, and either open in front, or not, and it should have long sleeves, so that the arms may not be exposed. Over this chemise there is worn a cotton shirt, and then a neck-handkerchief round the neck, so that the upper part of the breast, which is generally exposed to the air, may be rather better protected than the rest of the body. In summer, and whenever the weather is not cold, these two pieces, together with the head-dress, compose the whole of the woman's dress; otherwise she puts on a long wadded-silk-gown open in front all the way down; in this gown there is the double advantage of being warm, and very light. However, like the dress of the child, that of the mother is a matter which we generally leave to the nurse; and provided the several pieces be sufficiently large, and their number and thickness suited to the temperature of the weather, or the habits of the patient, she should always be allowed to arrange her dress as she pleases. The same may be said as regards the head-dress, except that it would not always be safe to permit the patient, which she sometimes requests, to have her hair cut, or sprinkled with salt.

The breasts do not require to be supported, or provided with wadded cushions, unless they are very large, and where there is fear of taking cold. The bandage which some women use for the purpose of compressing them, and preserving their shape, produces quite a contrary effect; besides, by impeding the action of the respiratory muscles, it may oppose the return of blood to the thorax, give rise to apoplectic symptoms, as happened to two imprudent women mentioned by Baudelocque, and become the cause of a number of diseases, each worse than the other; the astringent or repellent cataplasms employed for the same purpose, and to prevent the secretion of milk, deserve the same reprobation.

1236. I would say as much of the *belly-bandage*, so much blamed by De la Motte, were it used solely for the gratification of a vain coquetry, but I think it useful in another way. In this, as in all other things, we must take care not to confound the abuse with the wise and reasonable use of things.

Doubtless, by strangulating the abdomen with a towel, to reduce their size and prevent the formation of scars or inevitable wrinkles, women expose themselves to great dangers, without any chance of obtaining their object; but, as has been advanced by Smellie, Baudelocque, M. Gardien, &c., a bandage that is moderately tight, or simply gives a good support, may be of great service, and counteract the formation of many serious diseases. The suddenness with which the womb empties itself causes the abdominal viscera, immediately after delivery, to be all at once relieved from a long

continued state of pressure; the abdominal parietes, as they do not follow up the retreating movement of the uterus, no longer support the digestive organs with the same power; a kind of vacuum is effected in the large vascular trunks, and the blood should be determined there with so much the greater force, as it had only penetrated them with difficulty for some months; hence arises a greater tendency to hemorrhage, inertia of the womb, inflammations and functional disturbances of the liver and intestines. Hence, says Van Swieten, the syncopes that are so frequently met with in women recently delivered, though M. Désormeaux thinks they often depend upon hysteria; again, Stoll thinks that this is the principal cause of the puerperal peritonitis. Now, the bandage, as I understand it, is intended to supply, as far as possible, the action of the abdominal muscles, to promote the concentric movement of the uterus, and prevent the afflux of blood towards that organ and the engorgement of all the other viscera: besides, it is easy to acquire an idea of its utility, by reflecting upon the dangers that follow the operation of paracentesis, where the surgeon omits the precaution of applying a compressive bandage upon the belly, after the evacuation of the fluid; for as to degree, the pressure upon the parts contained within the abdomen experiences nearly the same transition in a woman delivered of a child as it does in a dropsical patient undergoing the operation of tapping.

It is true, that if not carefully applied, the bandage soon rolls up into the form of a string, and becomes more hurtful than useful; that, as M. Désormeaux remarks, most of those women who neglect to apply it, are not evidently worse off on that account, and that the use of it could not have entered into the original plan of the constitution; but as, when placed so as to produce no uneasiness nor pain, I cannot perceive how it can do any harm, and as in many cases it is incontestably useful, we should by rejecting it expose ourselves, without any motive, to see symptoms arise which at first it would have been very easy to repress or prevent.

It is composed, first, of a towel folded into a triangular shape, which is placed on the hypogastrium with the point downwards, and then of another napkin, which is folded once or twice lengthways, and passed round the body like a bandage, embracing the hips.

To prevent it from getting into folds, the last napkin should be supported above by a scapulary on the two ends of a bandage, arranged like suspenders, and below by pinning the ends of her *cloth* to it.

The *cloth*, formed of a piece of fine linen folded three or four times, and sufficiently long to cover the vulva, and go to be pinned to the body bandage both before and behind, is designed to receive the fluids that are discharged from the vagina, and to pre-

vent the bed-clothes from becoming soiled with them: when care is taken to renew them frequently, and not to pin them too tightly, none of the ill effects will ensue so justly attributed to the old fashioned *cloth*, of which some women still make use, and which consisted of various tampons kept in the vulva, and which more or less strictly stopped the passage of the vagina. Although it is not an indispensable article of dress, it seems to me that it may safely be permitted as a means of cleanliness to those persons who desire to have it, or who set any particular value upon its use.

1237. The *new bed*, to which the patient is about to be transferred, ought to be furnished with an oil cloth, if one can be had, and with a sheet folded into four layers, or of any other piece of linen fit to protect the mattress. The bed-clothes, the coverlids, and the arrangement of the bolsters do not require any interference on the part of the accoucheur, and ought, like every thing else, to be suited to the season and the habits of the woman.

She is to be transferred to the new bed shortly after delivery, and when the vagina is freed from the clots and the fluid blood, which commonly follow the expulsion of the placenta. She is then in a state of agitation, and can without inconvenience bear the little shocks which the transfer almost inevitably occasions. If we wait longer, as some authors have recommended, from fear of hemorrhage or convulsions, she would be in the situation of the traveler, who, having reached his post harassed and fatigued, can still take a few steps while heated, but when he once becomes still and cooled, is quite unable to walk. All this, however, is to be understood of cases in which every thing has passed naturally; for if the womb should not contract well, or should there have been any flooding or threatening of convulsions, or any other accidents that commonly ensue from a state of extreme weakness, the removal should be deferred for a few minutes in order to allay the danger or give time for the functions to return to their natural condition, while the woman is still upon the bed whereon she had been delivered.

1238. Those who get up, and go without any support to get into the other bed, run the risk of bringing on inversion, *anteversion* or *retroversion*, prolapsion of the uterus and many other dangerous complaints. They ought to be warned of it, and made to understand that they should allow themselves to be carried; when they are very weak, or any accident has supervened, which might be aggravated or recalled by too much motion, the two beds ought even to be placed side by side, for in this way the woman can be slid on the clean bed without moving her much, by making use of the sheet on which she laid during the labour, and which may be easily removed afterwards.

When put to bed, it would be useless, and indeed not always free from danger, to compel her to preserve an attitude that she

is unaccustomed to, to make her bed represent an inclined plane for example, (descending towards the foot,) for the purpose of favouring the escape of the lochia, or, on the other hand, to keep her hips raised higher than her head, with a view of moderating the fluxion of fluids towards the genital organs; she will lie upon the back, with the legs stretched out and close together, should that position appear more convenient and not fatiguing to her, but she ought not to be prevented from turning on the side, and bending her limbs if she wishes to do so. In all respects she should be allowed to consult her own ease, and her own inclinations should be attended to. The fatigue and weakness brought on by the constraint of a fixed posture, would of themselves be sufficient to bring on some accidents, and constitute a morbid state, even in a healthy person subjected to them; and they should, *a fortiori*, be dispensed with in women whose functions, being temporarily disturbed, require so much care and caution for their restoration to a natural state.

1239. All that has been said, in speaking of the management of a woman in labour, relatively to the air which surrounds her, the chamber, and her moral condition, is equally applicable to her during the subsequent confinement. It is important that she should neither speak nor be spoken to, except when necessary. A calm state of the mind and repose of the body are so indispensable, that too much care cannot be taken to remove every cause that might interfere with them. The value of this precept was so well understood in ancient Rome, that the magistrates themselves had no right to enter the house of a lying-in woman for the execution of any sentence or decision whatever; and in order to secure the respect of the citizens for her asylum, it was sufficient, says Juvenal, to suspend a wreath at her door.

Foribus suspende coronas.
Jam pater es.

Most of the diseases which affect a woman in child-bed may be attributed to the thousands of visits of friends, neighbours, or acquaintances, or the ceremony with which she is too often oppressed: she wishes to keep up the conversation; her mind becomes excited, the fruit of which is headache and agitation; the slightest indiscreet word worries her: the slightest motives of joy agitate her in the extreme; the least opposition instantly makes her uneasy, and I can affirm that among the numerous cases of peritonitis met with at the *Hospital de Perfectionnement*, there are very few whose origin is unconnected with some moral commotion.

1240. After the delivery of the placenta, and putting to bed, the woman is commonly seized with a rigor, which sometimes goes so far as to occasion a rattling of the teeth together. Some

physicians and the public have on this account deemed it best to cover her over with a weight of bed-clothes ; but this rigor, which is sufficiently accounted for by the changes that have just occurred in her system, and which must not be confounded with the chill of peritonitis, lasts but a few minutes, and scarcely deserves any particular attention.

It would, doubtless, be imprudent to cover the lying-in woman too lightly ; but it would be equally dangerous to fall into the opposite excess. By covering her with thick bed-clothes and surrounding her with well closed bed-curtains, and, in fine, by keeping her too warm, besides the headaches, floodings, and convulsions to which she would be exposed, we rarely fail to produce a more or less abundant perspiration, which it is sometimes difficult to suppress ; this diaphoresis probably has a great deal to do in producing the miliary fever, which is so uncommon at the present day, and which was formerly so often met with in lying-in women.

1241. Sleep being of the first necessity to a being worn out with fatigue, there would be a sort of cruelty in not permitting the woman to enjoy it: in advising that she should be kept awake for several hours for the purpose of avoiding hemorrhage, De la Motte certainly did not in this morbid phenomenon distinguish the effect from the cause. Although women sometimes do fall asleep with all the appearances of health, and wake up soon afterwards in the midst of a profuse flooding, there is a far greater number who owe their well being only to the beneficent influence of a refreshing sleep. Besides, these floodings were imminent, or had even begun at the time the women fell asleep ; the desire for sleep being one of their most common symptoms ; if they should be unsuspected at first, and the woman yields to the necessity she feels, she in fact falls into a dangerous sleep, and sometimes never awakes from it ; but in this case the sleep is the effect, and not the cause of the disease ; it is consequently not contra-indicated by any thing ; only, prudence requires that the pulse should be watched, and that the hand should from time to time be placed on the hypogastrium, to ascertain that the womb has not fallen into a state of inertia.

After this first sleep, that is to say, after the lapse of two or three hours, she should sit up in bed and take a little broth ; this position serves to rest her, and allows the lochia which had accumulated in the vagina to flow readily off.

In the following days her linen is shifted accordingly as she gets it soiled ; the external parts of generation should be often washed, and cleansed with mallows-water, which may, without inconvenience, be replaced by a decoction of chervil mixed with milk ; constipation, so frequently met with in these cases, is combated by means of mild clysters, without regard to the prejudice

which decides that no clyster should be given previously to the occurrence of milk fever; smarting about the meatus urinarius, difficulty of making water, hemorrhoids, and other effects of the frictions which must be experienced by the bladder and rectum while the fœtus is passing out, require emollient or slightly aromatic lotions, hip-baths, and sometimes the use of the catheter.

1242. The *regimen*, both alimentary and medicinal, of lying-in women, is a point deserving the whole attention of the accoucheur—not on account of the number or energetic quality of the substances which it is proper to administer, but because there are no where else so many vulgar practices to proscribe, so many ridiculous prejudices to extirpate, as upon this subject.

Drink should only be given to satisfy thirst, and not for the mere pleasure of making her swallow ptisan; the woman requires a drink, and not a medicine. In regard to this, her taste and idiosyncrasy may be consulted. She commonly continues to use one of the ptisans which she had been advised to use during her labour. When tired of one, another is given to her, and provided they do not prescribe some of those bitter, exciting infusions, or some active compound, of which the old women are so prodigal, she may in general be allowed to take what pleases her best. Hot wine, aromatics, alcoholic tinctures, coffee, tea, and chocolate are not more admissible after than before her lying-in.

The *food* should be light, and given in small quantity: broth given one, two, or three times a day, or some messes of potage, are all that prudence will allow before the milk comes to flow freely. Eichèle has supposed that by abstaining even from the broth, and making use of debilitating measures, the milk fever would be prevented from coming on; but I have often had opportunities of proving the absurdity of such an assertion. If the woman is to suckle her child, it is not improper to allow her to have potages of a rather more substantial kind the day after the delivery; in the opposite case I give nothing but broth. Upon this subject, attention must be paid to her state of health, her habits and constitution; we ought not, for example, obstinately to restrict a majority of country women to too severe a diet, for, although many of them may have fallen victims to the many imprudences they commit, there is a much larger number who, without making any change in their ordinary diet, and continuing to eat cutlets, bread, and all sorts of meats, and at times very gross food, yet get up, walk about, and do their customary work, in two days after child-birth, without any bad effects following such a course.

1243. When the secretion of milk has taken place and nothing unnatural has happened, she begins to return by degrees to her common mode of living; she passes gradually from soup and panada, and semouilles and rice-milk, to boiled eggs, white meats,

fried fish, chops, and other common dishes; so that in from eight to ten days the patient has no more need than any body else of being directed in relation to the choice of her food. The same is true of her drinks; from wine and water she proceeds gradually to the use of beer or pure wine; in fact the ptisans may be laid aside after the fourth or fifth day. Many women, however, particularly those who cannot or will not suckle, would not think themselves safe were not certain infusions and medicines prescribed for them previous to their resuming their ordinary regimen. The *canne de Provence*, the *arundo phragmytes*, and the lesser periwinkle, especially enjoy a great reputation in this respect with the public. According to the statements of the nurses and old women, the decoction of these plants is a powerful means of repelling the milk. The woman cannot dispense with its use if she wishes to avoid tetters, swellings, pains, and all the consequences of the *lait repandu*, a common bug-bear even to the best informed women.

The ptisan of *canne* is too insignificant and inoffensive for us not to prescribe it for women who repose any confidence in it; the *arundo phragmytes* is scarcely more active; but, according to M. Désormeaux, the periwinkle injures the stomach, excites the pulse, and ought to be proscribed.

1244. Whether these drinks have been made use of or not, almost all women in child-bed desire to be purged before they get up altogether; they then use sometimes an anti-lactic purge, and at others some one of the ordinary cathartics. Weiss's whey and sal de duobus have long enjoyed great vogue among the former; while the latter most generally use manna, or castor oil, Seidlitz water or decoction of senna.

I am aware that it would be dangerous to give such remedies without discrimination to all women, as has heretofore been done; but is it a much wiser course to reject them all, as a great many physicians of the present day recommend to be done?

If the accoucheur fails to order them, he exposes himself to a thousand reproaches, which I am sure are unjust, but which, nevertheless, cause him to lose the confidence of his patients; should the woman be seized with headache or rheumatism, even ten years after her lying-in, the milk is the cause of it; do any pimples, or efflorescence on the skin, any fever, abscess, or any sort of inflammation make their appearance, it is always owing to the milk; and upon reaching a *certain age* it is still worse; if the features lose their freshness, if the colour of the cheeks and lips fades, if the eyes cease to be brilliant and bright, she is very careful not to accuse the inexorable sway of time, but she refers to the *lait repandu*, and the blame necessarily falls upon the physician who did not drive out that *dreadful milk* at her last confinement!

Such prejudices would doubtless not justify the employment of purgatives, were they as dangerous as some persons choose to say they are, and were they never of any use; but such are not the facts. I have frequently administered them, and can assert that I have never known them to produce any bad consequences; and that, in a great number of cases, they have evidently hastened the re-establishment of the digestive functions. I should be afraid of their action where the tongue is red and lanceolate, or where there are undoubted signs of phlegmasia in the abdomen; I believe them to be of no use where the strength and appetite return fairly and rapidly; but where the tongue is broad, whitish, yellow or greenish, the mouth bitter and clammy, and there is no appetite, even although there might be present some degree of fever, tension and sensibility of the epigastrium, a gentle purgative I have often found to be followed by the very best effects. I have seen these various symptoms disappear on the succeeding day in most cases, and the health be afterwards restored with a degree of promptitude that I had had no reason to hope for. By freeing the intestinal canal of the mucous deposit with which it is pasted over, the purgatives bring it into a state better fitted for the performance of its functions; the abundant secretions which they occasion to take place from the villous surface of the digestive passages, free the system from substances that could prove hurtful only, and impress upon the other functions a sort of shock by which nature profits.

I prefer the factitious Seidlitz water, or from six or eight drachms to two ounces of castor oil; their effect is sufficiently certain, and I have not seen them produce as much irritation as most other evacuants.

1245. The time that a lying-in woman ought to remain in bed is necessarily very variable, and the nine days, the period fixed by the vulgar, can be adopted only as a mean or general term. Five or six days are sometimes sufficient; but if the symphyses should seem to have been somewhat strained, the womb have a disposition to prolapse or become inverted, or the health appear frail, we ought to wait, and instead of eight or ten days, we should rather require her to lie still for two weeks. In all cases it would be wrong to permit her to return suddenly to her usual exercise, as some practitioners allow their patients to do. The first day she gets up she should remain half an hour upon a sofa, and an hour the next day; the third she may take a few steps and remain out of bed for two or three hours; and during the following days she should consult her strength and the degree of fatigue, as the rule for going to bed again. Soon after this she can go down and take a few turns in the garden, or in the yard; but it would be dangerous to go to church on the first occasion of going out. The churches are generally large, cold, and very freely ventilated.

In what is called their *churching*, the women should not keep long on the knees; they are sure to be fatigued before they go out, and often contract there the seeds of serious diseases. Real religion does not demand such imprudences; the woman ought to recover some degree of strength before she goes on foot to present herself at the altar; she ought first to have tried her strength at home, and make sure that it will not be injurious to her to go out into the open air.

1246. Another custom that the physician ought to watch over is the baptismal repast, if it takes place within the first ten days after child-birth. In this family feast joy is not forbidden; they laugh and they talk; she desires to hold out with every body; the father, the mother, the godfather and godmother, the brothers, sisters, uncles, aunts, &c., all talk to her in turn. She only takes a seat at table out of form, to be sure, or to make more sure of her prudence she keeps her bed; all the guests forbid her to eat or drink any thing; but in the mean time they oblige her to take a mouthful of *this* wine, a mouthful of *that*, then taste of *this* dish, and of *that*, so that it too often happens that at the close of the day she finds herself seized with symptoms severe enough to conduct her rapidly to the gates of death. It would be better, therefore, for her not to be present, unless it be beyond the tenth or fifteenth day; and even then she ought to be extremely cautious.

The lochia, the after-pains, and the milk-fever, three of the principal natural phenomena of lying-in, now deserve our particular attention.

1247. The term *lochia* is given to the substances that escape from the vulva, from the moment of the delivery of the secundines until the womb has recovered its normal size and consistence; the accoucheurs distinguish three kinds of them; the *sanguine*, the *serous* and the *milky* or *purulent*; or the red, the clear, and the white. The first are observed on the same day with, and on the day after the birth; it is blood nearly pure. The second appear at the end of twenty-four, or thirty-six hours, are formed of serum mixed with a variable quantity of blood, and do not last beyond the period of the milk-fever. The third succeed these, and last until the fifteenth, twentieth, or even thirtieth day, and are produced by the suppurative process going on upon the internal surface of the womb. Nothing, however, is more variable than their abundance and duration; the red lochia may cease from the first day and return on the fourth; I have even seen them re-appear on the ninth. Sometimes the purulent lochia do not appear at all, and in other cases they last so long that it is difficult to distinguish them from a leucorrhœa; this anomaly is, however, very easily to be understood by reflecting for a moment upon the cause of this evacuation.

Although freed from the child and the after-birth, the womb does not immediately recover its size and the other qualities natural to it; they do not return until the end of five, six or eight weeks, a period at which the menses reappear for the first time; the womb indeed always remains a little larger than it was before the woman became pregnant, and, in general, the more so, as gestation is more frequently repeated. During this period an insensible process goes on, by means of which the uterine parietes are disengorged of the substances they had imbibed. These fluids are directed more especially towards the cavity, because in that direction the tissue is less dense, and they find a freer issue. As long as the great uterine vessels are not emptied, blood only flows; at a later period it is serum combined with the detritus of the ovum and the mucous secretions of the organ. But a real suppurative irritation is soon established, the product of which, analogous in some sort to the non-contagious discharges from the urethra, by mixing with the serosity and mucus furnished by the womb, constitute the white lochia.

The lochia require only cleanliness; upon the access of the milk-fever they sometimes cease to flow, or at least sensibly diminish in quantity; nevertheless it is not uncommon to see these two phenomena proceeding together without interfering with each other. When they stop either before or after the milk comes, it appears to me to be generally useful to add to the means employed to recall them, the injection of emollient or slightly detergent fluids into the uterine cavity.

1248. The *uterine colics* or *after-pains* commence soon after the labour is over, and generally cease upon the appearance of the milk-fever, and rarely last longer than the serous lochia; they are more frequent and sharper in proportion as the labour has been more rapid and easy, and are sometimes strong enough to fatigue the woman considerably; being produced by the efforts of the womb to contract, it is quite natural that they should be stronger and more frequent in women who have had several children, than in those who are in their first child-bed. In effect, the womb, too rapidly emptied in the first-named case, does not contract soon enough to prevent the formation of clots in its cavity, is obliged to contract for their expulsion as often as they are reproduced, and each one of these contractions gives rise to a pain. In the second, having reacted for a long time upon the ovum, it is too much irritated at the close not to resume rapidly its natural size, and not permit the blood to accumulate within its cavity, and then there will be no clots, no contractions, and no after-pains; thus the presence of clots determines the contractions, and, as was the case during the labour, the contractions occasion the after-pains. I ought however, to remark, that these pains must also vary in respect to their intensity, the constitution of the patient,

and the circumstances; being stronger, for example, in nervous and delicate women, when the womb is already sore, and in a state approaching to inflammation, than in those who are in an opposite condition, though, in fact, the contractions are similar in both cases. It is by attending to these particulars that we are enabled without difficulty to explain their great severity in some women, where there is nothing to be expelled from the genital organs, and their mildness in others, where they coincide with the escape of large coagula; and how it happens that, instead of diminishing after the second day, they, on the contrary, continue to augment in some cases until the third and fourth day, &c.

It is important not to confound them with an incipient metritis or peritonitis; which, however, is a pretty difficult matter where they reach a certain extent of great severity; having too often avoided making this distinction is the reason why authors differ so much on the subject of puerperal peritonitis, and the treatment adapted to it; as long as the after-pains are clearly intermittent, and during their intervals, the belly is not sore; while there is no fever, and they have not been ushered in with a chill, there is nothing to fear and nothing to do; they are frequently followed by a pretty severely painful sensation at the hypogastrium, acceleration of the pulse, thirst, and heat of the skin, and, notwithstanding, are not followed by any serious complaints. But we must in such cases pay attention to them, and not forget that they may be the first symptom of a mortal disease.

When moderate they may be trusted to the resources of the economy, or we may give one or two cups of a weak infusion of chamomile, which rarely fails to make them disappear in the course of a day or two; otherwise, it is sometimes useful to prescribe a hip bath, and emollient or slightly narcotic injections; to exhibit sedatives or antispasmodics internally, or to bleed the patient once or twice, either from a vein or by topical means, while at the same time the hypogastrium is covered with cataplasms, and this accordingly as the woman is weak, nervous, or plethoric; it may be necessary even to introduce one or two of the fingers towards the os uteri for the purpose of assisting in the expulsion of a clot that may adhere too strongly; but in the great majority, these cases require no assistance.

1249. The *milk-fever* generally appears on the third day, sometimes on the first or second, or not until the fourth, fifth or sixth day; I have seen it not come on until the eighth, in a young woman at the *Hospital de la Faculté*: headache, *without chills*, heat and dryness of the skin are its common precursors; the pulse, which is at first small and hard, is soon developed; the breasts grow hard, swelled, and so painful in the course of a few hours, as to interfere with the motions of the arms and chest; first a moisture, and then a sweat succeed this stage; the pain in the head ceases;

the fever abates in the course of six, eight, ten, twelve or twenty-four hours, and the reaction which produces the milky secretion is completed; but the breasts remain swelled and painful much beyond this period, especially in women who do not give suck.

While the fever continues, no broths, nor potages, nor heating drinks should be given. Should it be too high, an attempt to moderate its violence should be made by means of a small bleeding. But in general it requires only the hygienic treatment pointed out higher up. The coming of the milk is pretty often preceded with the suspension, or at least a sensible diminution, of the lochial discharges, which soon return to their natural course. Sometimes these two phenomena seem to have no influence upon each other; the lochia do not appear again at all after the milk-fever is gone off.

For an account of lactation in general, the diet of the fœtus, the choice of a nurse, the disease of the breast and nipple; for the history of fistulas, whether, recto-vaginal or vesico-vaginal, or other serious lesions which are the effect or consequence of certain laborious labours, I can only refer to the general treatises on Physiology, Medicine, or Surgery that treat upon them; particularly those of MM. Richerand, Magendie, Adelon, Léger, Sabattier, Boyer, &c., and to the excellent articles by M. Désormeaux in the *Dictionnaire de Medecine*. But there are certain accidents of a less redoubtable kind, concerning which I cannot dispense with saying a few words in this place.

1250. Complete or partial *inversion* of the womb is recognized by the reddish or livid tumour which projects into the vagina or vulva, by the absence of the uterine globe above the pubis, and by the pains and syncope experienced by the woman, &c.; although none but the grossest ignorance could confound an inversion of the womb with a polypus in that organ, yet men are sometimes seen, even at Paris, to commit this mistake, even though they are clothed with the title of physicians. Haste should be made to reduce the displaced organ. For this purpose the woman should be so placed that her hips may be higher than her breast; then the hand being furnished with a piece of fine linen spread with cerate, the external tumour should be compressed gradually and without shocks,* and in a steady manner, and at all points, pushing it up

* This is the direction given by almost all the authors.—It is not good to compress the womb; such an action only excites the contractions or after-pains, which may as well take place in an inverted womb as in one not inverted—the womb ought not to be handled; by watching it carefully, at the moment when most free from contraction, the fundus may be pressed with the point of a finger, and indented like the bottom of a bottle; when that much is effected, the complete reposition is sure, if only a continual pressure be made: the fundus will be pushed up again through the os uteri and vagina, until the hand is found to be high up in the belly, and contained within the cavity of the repositied organ.—M.

along the axis of the straits until it has regained its natural situation.*

1251. The *descent of the womb*, which is pretty often met with in the early periods of a confinement, in women who have a very large pelvis, relaxed tissues, a lacerated perineum, or in those who make improper exertions, scarcely requires any thing after the reduction except rest and a horizontal posture; it is allowable only to add some astringent or styptic lotions, the use of small rags moistened with red wine, for example, in cases where there is no irritation. Pessaries cannot be made use of until a much later period.

1252. The *anteflexion* and *retroflexion*, that is to say, the state in which the womb bends like an elbow at right angles, so that its fundus comes to rest upon the sacro-vertebral angle or behind the pubis, a disease very well described by M. Ameline in his dissertation, and an instance of which in the dead body was shown to me by M. Comte, would be recognized by the same symptoms as the anteversion and retroversion, and would require nearly the same kind of treatment.

1253. *Lacerations of the perineum* generally get well of themselves, with the assistance of the hip-bath, by avoiding all motion, and by obliging the woman to keep on her side, so that the pus and lochia may not stagnate in the wound. They generally cicatrize more or less completely from the anus towards the commissure of the pudendum. The perineum may be perforated through and through, and the cure not be rendered any more difficult, provided that the anal and vulvar edges remain unhurt. I saw a case of this perforation produced by the passage of a large child, which was entirely cured by the eighteenth day, and did not hinder the woman at all in her subsequent labours. In some cases, however, it is necessary to cut the bridles, apply the caustic, and take up certain points with the needle, &c., but then the disease returns under the ordinary surgery, and cannot be regarded as one of the simple consequences of child birth. I shall say the same of lacerations of the vagina, of the cervix, body, and fundus of the womb; of rupture of the psoas muscles, of the rectus muscles and those of the sternum, observed at the *Paris Maternité* by Mesdames Boivin, Lachapelle, and by M. Comte. Upon this subject the excellent memoirs by Madame Lachapelle may be consulted, and in this book the article on extra-uterine pregnancy. I have not treated of *descents of the anteversion* and *retroversion* as diseases, because they are observed solely in women who are pregnant; lastly, in treating of hemorrhage, I said nothing relative to *transfusion of the blood*, practised anew in

* For a very good treatise on inversion of the uterus in general, see a thesis maintained, Dec. 1, 1828, at the Faculté de Paris, by M. Ferrance-Demissois.

these latter times by Messrs. Blundell, Doubleday, Waller, Brigham, Boyle, Brown, &c., because it is not yet proved that an operation so dangerous ought really to be adopted by wise and circumspect practitioners.

1254. *Infiltration* of the external genitals may go to the extent of closing the passage of the vulva, and, consequently, of preventing the discharge of the lochia. If the swelling be purely lymphatic, and not painful, it will disappear upon making a few pretty deep punctures upon the internal surface of the pudendum. Where there is sensibility and any signs of inflammation, recourse should be had to baths, embrocations, emollient cataplasms, and even to leeches, if the case require it.

1255. *The thrombus* of the labia pudendi, which was noticed by Levret, forgotten by most of the modern writers, pretty well described by Dr. Dewees, and of which I have seen seven or eight cases, may appear at the moment the head is engaging in or clearing the inferior strait, and even in the first two days after the birth of the child, as in the case lately published by M. Wintringer. The tumour sometimes involves both of the labia; more frequently only one is affected. Although in some cases it is from the size of a nut to that of a hen's egg, it is also found to assume in other cases much greater dimensions; it rarely disappears by resolution, and some women suffer from it horribly. Leeches and poultices are generally insufficient for its cure, but I have always found it to be promptly dissipated, and without any bad consequence, after a large and deep incision.

CHAPTER VIII.

PUERPERAL FEVER.

BY DR. W. HARRIS.

PUERPERAL fever, a disease of a grave character, has prevailed more or less extensively in all ages.* It is noticed in the earliest records of medicine, by Hippocrates, and since his day it has occupied the attention of many of our most distinguished medical authors.

By the older writers the disease was called childbed fever; but the more comprehensive term *puerperal*† was substituted, in the year 1716, by Dr. Strother in his critical essay, entitled *Criticon Febricum*.

This learned gentleman, in alluding to its fatality, quaintly remarks that “puerperal fevers are shelves poor females are often staved upon;” and Denman says “it occasions the death of much the greater part of those who die in childbed.” While Ferguson maintains that “one out of three will die with all the resources which medicine at present offers;” and Clarke says, that “three-fourths of those who have been seized with it, have fallen sacrifices to its severity.”

A puerperal epidemic prevailed in Paris, in 1746, in Edinburgh, in 1773, and in Vienna, in 1795, from which not a single patient recovered.

From the best authority, I have learned that as often as this frightful malady has prevailed in the Pennsylvania Hospital, in an epidemic form, every case terminated fatally.‡ From the same

* Rachel, the wife of the patriarch Jacob, died of childbed fever after she gave birth to Benjamin, and the wife of Phinehas after she travailed with Ichabod, which are cases of high antiquity.

† Puerperal from *puer* “a child” and *parere* “to bring forth.”

‡ Dr. Stewardson states that a puerperal epidemic broke out in that institution in 1830, while he was resident physician; that the symptoms were strik-

source, I have also learned that patients have recovered, in that institution, from mild sporadic forms of the disease; but that taking the epidemic and sporadic cases together not more than one out of ten recovered. This disease seems to be an endemic of this valuable institution, and its ravages have been so frightful at several different times, that the managers thought it prudent to close their doors, for a season, against all parturient females.

The Lying-in Department formerly occupied the second story of the central block of the Hospital, which was always kept remarkably clean and well ventilated; and was attended then, as it is now, by the most distinguished obstetricians of this city. The fatality, however, was so appalling that the managers, by the advice of the medical attendants, decided to remove the lying-in Department to the Picture House, a new building on Spruce Street; but, the disease has there also been equally mortal. Early last spring, three cases, in quick succession, terminated fatally, and since that time no more parturient females have been admitted.

What strikes with astonishment, is, that the old Alms House, which was located only two squares farther west, and which abounded with filth and a "rank compound of villainous smells," was comparatively exempt from puerperal fever, and that when the disease did prevail it was less fatal.

A puerperal epidemic prevailed pretty extensively in Southwark, in 1842, and in the early part of the present year, and, although I cannot speak positively as to its comparative mortality, yet I am assured, by those who are familiar with its details, that none of the various forms of treatment, adopted by the *different accoucheurs*, was attended with much success. Doctor Condie made his first oral communication, upon the subject, to the "Philadelphia College of Physicians" on the 3d of May, of that year, published in their "Transactions," in which he represents the epidemic as one "of a peculiarly insidious and malignant character," and says that "nearly every case of the disease that has occurred up to this date has terminated fatally."

In casting my eye over the statistics of the puerperal epidemics ingly similar to those which characterize the epidemic of 1842, as "it occurred in the southern sections of this and neighbouring districts," and that "the patients all died."

reported by Leake, Hunter, Clarke, Gordon, Campbell, Armstrong, Lee, Collins and Ferguson, I find that nearly one half of all the cases terminated fatally.

As an epidemic, puerperal fever prevails more among the lower than the higher classes ; but in its sporadic attacks, it seems to have no respect for persons. It is more prevalent, too, and certainly more virulent in hospital than in private practice. It has no predilection, however, for one constitution more than another. It occurs alike in the plethoric and anemic ; in the robust and the feeble ; in the young and the middle aged ; in the married and the single ; after the first and subsequent confinements ; after rapid and easy or protracted and difficult labours ; and, according to Dr. Condie, "in those surrounded by every comfort, and receiving every attention their situation demanded, as in the poor and the destitute."

Pathology.

Puerperal fever is either *inflammatory* or *congestive*.*

The inflammatory form of the disease is more mild and curable, except when it extends to the veins or lymphatics ; the congestive more malignant and often beyond the reach of the best directed remedial agents.

The phlegmonous form of puerperal fever may have its source in an inflammation of the muscular and mucous coat of the uterus and is, in this case, strictly speaking, a *puerperal metritis* or *hysteritis*. Or it may commence in an inflammation of the peritoneal coat, that covers the uterus and its appendages, and partially the other pelvic viscera, constituting *puerperal peritonitis*. Or it may commence in a phlegmonous condition of the veins of the uterus, which is followed by a secretion of pus that circulates through the vascular system, and often has a fatal termination. This form of the disease is noticed by numerous writers ; I may instance Clarke, Waller, Meckel, Ribes, Louis, Dance, Tonellè, Burns, Lee, Boivin, Dugès, Ferguson, Colombat, Blackmore, and Ashmead. Nor can this form of the disease be very uncommon,

* Dr. Blackmore, of Edinburgh, says the disease presents itself in two forms, or varieties ; the one he designates as "*synochal*, sthenic, or more benign," the other as "*typhoid*, asthenic, putrid, or more malignant."

when out of 134 cases in which M. Tonellè made careful microscopic examination, he found pus in the veins of 93 and 3 others in which it was clearly demonstrable in the thoracic duct; and out of 45 cases, Doctor Robert Lee had 24 of uterine phlebitis.

Or the disease may have its origin in an inflammation of the uterine lymphatics. This variety was first observed in France by M. Dance, and afterwards by Boivin and Dugès, Tonellè, Duplay, Cruveilhier and Nonat. Cruveilhier found pus in the lymphatics in thirty-two cases, and in the thoracic duct of three. Dr. R. Lee, too, relates an interesting case of this variety in the *Medico-Chirurgical Transactions*, in which he states that "the uterine lymphatics" were filled with pus, as well as the "*receptaculum chيلي*," where it "was mixed with lymph, so as to be more solid;" and M. Tonellè, in his memoir on the puerperal fever, as it appeared in La Maternité, in 1829, states that out of 222 cases, in which microscopic examinations were made, "suppuration of the lymphatics occurred 44 times."

It may also be caused by "congested venous blood in the abdominal and pelvic viscera," or in the brain, or both, constituting the *congestive* or *typhoid* form of the disease.

Further, it may be due to a sudden shock given to the nervous system, by which all the nervous power or dynamic forces are suddenly prostrated, producing a variety which we call *puerperal adynamia*. Of this variety there are cases without number reported by various authors. Dr. John Clarke in his "Essay on the Epidemic Disease of Lying-in Women," remarks that "the brain and nervous system seem not to be without their share in the disease; the energy of the one and the other being manifestly diminished; hence, in the early stage we find the muscular power very much diminished, and the short duration of the whole complaint hardly gave me time to discover the real nature of it. When asked respecting their sensations, their common answer is that they are very well, and sometimes beg to be allowed to get up when within a few hours of their death." Professor Chapman, in his Lectures on Yellow Fever and on Typhoid Pneumonia, related a number of insidious or "walking cases" of those diseases, the symptoms of which strikingly resembled some of the puerperal cases reported by Clarke. Burns remarks, too, "that some cases prove fatal rather from mere exhaustion than inflam-

mation; as they are marked by great dejection of mind, languor, with general debility of the muscular fibres, and the patient makes little or no complaint." As many of these cases have neither chill nor fever, neither pain nor hypogastric tenderness, as the energies of the system are depressed and cannot be made to react, and as necroscopic observations have shown that the "brain and abdominal viscera were congested with venous blood," accompanied with softening of tissues, and all the other evidences of typhoid fever, it would seem inconsiderate in any pathologist, however distinguished, to contend that all cases of puerperal fever have their origin in "acute extensive and dangerous inflammation," which cannot "be combated by any means short of the most signal and active of those which are called anti-phlogistic."

Or puerperal fever may be erythematic or erysipelalous in its character. Dr. Condie remarks that "in the neighbourhoods, and even in the houses in which cases of puerperal fever have occurred, erysipelas has prevailed to a greater or less extent. Erysipelas has indeed been far more prevalent throughout the whole of the districts south of the city, during the past winter and spring, than he has known it to be during the last twenty-six years;" and Dr. Blackmore, of Edinburgh, remarks, that "erysipelas, with puerperal fever, is known to prevail epidemically, and to exhibit analogous varieties of the more fatal character." This learned gentleman attempts to prove the identity of the two diseases, and says that "the poison of erysipelas was the origin of the puerperal epidemic" which he witnessed. Several other authors, celebrated for correct practical observation and sound discriminating judgment have expressed their doubts as to whether puerperal inflammation is of a *phlegmonous* or *erysipelalous* character. Peauteau, who wrote nearly a century ago, gave it as his opinion that "puerperal fever is of the nature of erysipelas;" and the celebrated Gordon says, in his treatise on the epidemic of Aberdeen, "I will not positively assert that puerperal fever and erysipelas are precisely of the same specific nature; but that they are connected, that there is an analogy between them, and that they are concomitant epidemics, I have unquestionable proofs. For these two epidemics began in Aberdeen at the same time, and afterwards kept pace together; they both arrived at their acmé

together and they both ceased at the same time ;” and Hey, in his treatise on puerperal fever, says that “ erysipelatous inflammation prevailed as an epidemic during the whole period of puerperal fever, and in many cases was of a very malignant character.” Drs. Home and Young, of Edinburgh, and Dr. Lowder, of London, maintain the same opinion. Erysipelas, too, prevailed simultaneously with the puerperal epidemic of 1787 and 1788, described by Dr. John Clarke, and Burns notices an erysipelatous variety. Puerperal phlebitis in the mother and erysipelas in the infant, prevailing simultaneously, have been repeatedly observed by Osiander, Meckel, Lee, Campbell and Buschett; and Dr. Benedict of this city attended a case of puerperal fever in the mother, the infant and nurse both having at the same time extensive erysipelatous inflammation. Had we space we could multiply authorities to show the intimate connection or simultaneous prevalence of these two diseases. Besides, we often observe in other maladies, that erysipelas attacks the internal surface. In scarlatina maligna it assails the mucous lining of the throat, and not its dermoid covering.

Causes.

It is conceded by the medical profession generally, that there is an *epidemic* and a *sporadic* form of puerperal fever; and that the former is produced by contagion, or by a morbid atmospheric influence, while the latter has its origin in difficult labours; in clots or fragments of the placenta retained in the uterus; in constipation of the bowels; in suppression of the lochia; in arrest of the secretion of the milk, &c.

In the “ observations” of Dr. Blackmore “ upon the origin and treatment of puerperal fever” he contends “ that it is contagious in each of its forms, *sthenic* and *putrid* ;” and that, in an epidemic that prevailed at Plymouth, the disease commenced in the practice of an accoucheur that had been previously “ in constant communication with cases of erysipelas,” and wishes to inculcate the opinion that the poison of erysipelas was the origin of the puerperal fever,” and that the contagion was carried in the clothes of this accoucheur from patient to patient, as the cases for several weeks, in the commencement of the epidemic, were confined exclu-

sively to his practice. He had eighteen cases in rapid succession, eight of which terminated fatally, "when no similar cases were heard of in the practice of any of the other accoucheurs."

Our worthy townsman, Dr. Condie, in speaking of the Southwark epidemic, states that "the disease was exclusively confined to the circle of a single physician, extensively engaged in obstetrical practice, while no instance of the disease has occurred in the patients under the care of any other accoucheurs practising in the same district; scarcely a female that has been delivered by this gentleman for weeks past has escaped an attack, and nearly every case of the disease terminated fatally." The respectable physician to whom Dr. Condie alludes, in the above remarks, apprehensive that this frightful epidemic was propagated, not by atmospheric influence, but by personal communication, resolved that he would try the influence of a thorough purification in the country; accordingly he left the city for a week, and, after appropriate ablutions of his person, he exchanged every article of his old wearing apparel for new; but, to his great mortification, "the first case of parturition that he attended after his return, was followed by an attack of the fever and terminated fatally." By this experiment, he satisfied himself that the disease was not transmitted by contagion conveyed in his person or clothes, but propagated by a *distempered state of the atmosphere*, which no precaution could exclude from the lying-in chamber.

Forty out of fifty-three cases, in the Sunderland epidemic, according to Dr. Armstrong, occurred in the practice of one surgeon and his assistant: and all the English writers, indeed, whose observations and experience qualify them to give an opinion, advocate the contagious character of the disease. Professor Hamilton affirms that it is an infectious disease, and Doctor Campbell says, "in October, 1821, I assisted at the dissection of a woman who died of the disease, after an abortion; the pelvic viscera, with the external coats were removed, and I carried them in my pocket to the class-room. The same evening, without changing my clothes, I attended the delivery of a poor woman in the Canongate; she died; next morning I went in the same clothes to assist some of my pupils, who were engaged with a woman in Bridewell, whom I delivered with forceps, she died, and three others shared the same fate in succession."

And in June, 1823, after dissecting another female who died of the disease after delivery with forceps, he says "for want of accommodation, I was unable to wash my hands with that care which I ought to have done; on my arrival at home, finding that two patients required assistance, I went to them without further ablution of my hands, or changing my clothes, and both of them were seized with the disease and died."

"It is hardly possible," observes Dr. J. Clarke, "to prove that it is not infectious;" and Dr. Gordon, of Aberdeen, says the disease attacked such women only as were delivered by a physician, or attended by a nurse, who had previously attended those affected with the puerperal disease. It is related, moreover, by Dr. Gooch, that a practitioner, after he had opened the body of a female that died of puerperal fever, without changing his clothes, delivered a lady soon afterwards, that was attacked by a similar disease and died, and that two more of his lying-in patients in rapid succession met the same fate. Alarmed at the thoughts of carrying contagion in his clothes, he washed carefully his whole person, changed every article of his dress, and afterwards met with no more cases of the kind.

These cases are full of interest, and would, in my judgment, settle the question as to the contagious character of puerperal fever, were it not that many other accoucheurs, and some in our city, have dissected bodies that died of the disease, and, afterwards, without changing their clothes, have officiated again and again, without propagating the disease. I think, however, with the facts that are before us, no accoucheur should dissect, or even be present at the opening of dead bodies that die of puerperal disease, lest his person or clothes might become charged with the contagion, and be carried to his lying-in patients. Let this work be consigned exclusively to the surgeons who do not attend parturient females; and when an accoucheur has paid a visit to a puerperal patient, let him go immediately home, and there resort to free ablutions and change his wearing apparel, before he visits any of his healthy lying-in patients.

He should be careful, too, with respect to the instruments which he uses in his puerperal patients—as a practitioner who introduced a catheter in the case of a poor woman labouring under puerperal fever, late in the evening, and in the course of

the same night he attended a lady in her confinement in the country, and introduced the same instrument, which was followed by an attack of the same disease. Had this instrument been carefully washed with Castile soap and boiling water, and the accoucheur's hands been thoroughly cleansed, the catastrophe that followed might have been avoided. I should like to occupy a few pages more with a ramble through the Lying-in Hospitals of Great Britain and of the Continent of Europe, to examine the causes of some of their most fatal puerperal epidemics, in which "Death grinn'd horribly a ghastly smile," in terrible derision of the healing art; but space is not allowed me, and I must, therefore, refer the reader to Dr. A. C. Baudelocque's *Prize Essay* on puerperal peritonitis, consisting of 480 pages, in which every division of the subject is extensively and ably discussed.

The Symptoms.

Epidemic puerperal fever generally commences within forty-eight hours after the accouchement;* and in hospital patients earlier than in those in private practice. To this general rule there are some exceptions, as cases are reported by Denman and others in which the disease commenced before parturition; and Hippocrates relates an instance in which the attack was delayed until the fourteenth day.

A rigor, or shivering fit, succeeded by hot fever, terminating in profuse perspiration, with a rapid pulse, severe pain in the hypogastric region, and great tenderness upon pressure, are the prominent pathognomonic symptoms of most cases of puerperal fever.

Chilliness, however, does not uniformly characterize the commencement of the disease. Out of Dr. Lee's hundred cases, forty-eight had rigors; and of Dr. Collins's eighty-eight cases, thirty-three only commenced in this manner. While Dr. John Clarke, in speaking of the malignant epidemic he attended, remarks, "it has not occurred to me to see any case in which the disease began with a shivering fit. If there was any degree of

* In Dr. Collins' report of 88 cases in his Hospital practice (Dublin), 32 were attacked on the first day; 29 on the second; 8 on the third; 2 on the fourth; and 1 on the eighth.

rigor it has been so slight as to have escaped the attention of the patient and the observation of the attendants."

The *fever* which follows the shivering fit, is generally very hot, and is accompanied with intense thirst; although Clarke says, "the heat of the skin is seldom increased either to her own sensations, or to those of her attendants."

The *perspiration* that succeeds the fever is occasionally very profuse, and according to Denman, "is often completely critical."

The *pulse*, in this disease, has almost invariably an unusual quickness, beating from 120 to 160 strokes in a minute, and is at the same time small, hard, and incompressible. Clarke remarks that "the frequency of the pulse is often the first symptom that is observable in the complaint."

The *pain* which accompanies the disease is generally seated in the hypogastric or one of the iliac regions, and augments in intensity as the fever increases. The situation of the pain, however, is variously described by different authors. Forster says it was seated mainly in the epigastric and umbilical regions; Hulme found it in the iliac; Gordon in the hypogastric; Campbell above the pubis and in the groins; and in some of the most malignant cases, described by Clarke and others, the patients did not complain of pain at all, although their course was rapid and their termination fatal.

The nature of the pain, in most instances, affords a good indication of the character of the disease. In the irritative stage before inflammation is actually developed, the pain is often intermittent or remittent, and is relieved by pressure; the os uteri is without any unusual sensibility, and here the accoucheur often finds it difficult to decide whether the patient is afflicted with periodical spasmodic contractions of the womb, *after-pains*, or with pain arising from inflammation of the womb and its appendages. The frequency of the pulse, and the soreness of the hypogastric and iliac regions upon pressure, will assist him to diagnose correctly between after-pains, and the commencement of puerperal fever.

As the disease advances, the lochial discharge is mostly arrested, but occasionally, even in the worst cases, it is undisturbed. The secretion of milk too is almost invariably suppressed; but to this there are also exceptions: the abdomen becomes distended with

flatus, or fluids, or both, so that the patient sometimes becomes as large as before delivery; she voids her urine with pain and in small quantities at a time, which is mostly turbid; tormina and tenesmus, too, are occasionally added to her sufferings; and there is often a vomiting of green or yellow bitter matter, and in the last stage a coffee ground discharge, resembling *black-vomit*. An unusual symptom was noticed by Clarke in a great many cases, which was *a dislike to the offspring, and a refusal to suckle it*. Towards the termination of the disease *aphthæ* extend over the inside of the mouth, throat and œsophagus. In the commencement, the *tongue* is moist, white and soft; but as the disease advances it undergoes many changes—sometimes covered with a brown fur, dry and rough, at others it is clean and of a bright red colour; and occasionally a brown sordes covers it and extends to the gums and teeth. The brain and nerves are sometimes involved in the disease;—hence we occasionally meet with delirium, stupor, singultus, &c. The latter symptoms are common in the *typhoid* form of the disease.

Prognosis.

The discreet physician will always predict with reluctance the favourable issue of a case of puerperal fever; because under the most prompt, vigorous, and skilful management, it may terminate fatally. There is a fearful responsibility, too, in deciding for hope, or for despair; for life or for death; especially in a disease where dissolution is not unfrequently preceded by an appearance of convalescence. By physicians of large experience, this disease is regarded as worse than the plague. “The pestilence,” says Hulme, “like a fierce and untamed enemy, spreads his hostile banners in open day, and feasts on carnage and destruction, till glutted with slaughter, he himself sinks down and dies! But the puerperal fever, like a secret revengeful foe, stabs in the dark to the very vitals; and though he kills only one at a time, yet he is privately slaying every day, and never satiated; thus making up in length of time what the other does by a sudden devastation.”

As a correct prognosis is quite as essential to the reputation of a medical man, as his skill in the management of the case, I shall endeavour to give such precise directions as will enable every

accoucheur to distinguish the favourable from the unfavourable issues.

The previous state of the patient's body and mind, as to health and tranquillity, will of course greatly modify the chances of recovery; hence we find, in the history of all puerperal epidemics, that the feeble, the intemperate, the forsaken, the unmarried, and the unhappy; from whatever cause, were the first to be assailed and the last to recover. Other things being equal, the prognosis will be more unfavourable in hospital, than in private practice; and the danger is greater in proportion to the earliness of the attack after labour. "Those who have had the disease at a later period," says Clarke, "have not been attacked with the same severity; the depression of strength has been less considerable, and their chance of recovery has been considerably better."

The fifth is, for the most part, the *critical day*.

"If the pulse be very quick," says Hulme, a practitioner of great experience, "and the respiration frequent and small, it portends great danger. If, on the contrary, the pulse becomes slower, the breathing more free and full, it is a certain sign of a change for the better. The degree of these, is to ascertain the degree of danger, or safety to the patient. A quick pulse, singly considered, is, at all times, a dangerous symptom, and the more so if weak and small. The contrary indicates safety. If the pulse does but once begin to become daily slower and slower, as from 120 to 112, and then to 100, or the like, it is to be esteemed as one of the best signs. But, if it continue at the same number, or rather quicker, it always threatens danger; or, if it be found changeable, being one day quicker and another day slower, it is ever to be suspected. Nay, so infallible is the beat of the pulse, with respect to number, that though all the other symptoms should abate, and the disease seems to be gone off, yet, if the pulsations do not decrease in proportion, a relapse, or some other disorder is to be feared." (P. 31.) The great value of the above quotation is a sufficient apology for its length. The state of the pulse, as to its frequency, is acknowledged by many authors to be the chief symptom on which to found a correct prognosis.

"*Diarrhœa coming on at the beginning, if followed by a slower pulse, prognosticates safety.*" (Hulme, p. 32.) And stronger ground of hope is furnished, if the looseness is followed by a diminution of the distension of the abdomen, and especially if the patient

feels relief after each evacuation; but if the pulse should not become slower, and the abdomen not subside, the case is one of alarming import.

If the *respirations* be feeble and short, and more than fifty in a minute, the indication is unfavourable. Frequent vomitings of vitiated bile, or coffee grounds fluid; an increase of pain and distension of the abdomen; involuntary stools; delirium; cold, clammy skin; fluttering pulse; collapsed features, and dilated pupils, are all the precursors of death.

On the contrary, if the patient's respiration becomes slower, more easy and deep; if she can turn herself in bed and lie comfortably on either side; if erysipelas should appear upon the extremities, or abscesses upon any part of the body; if the pulse becomes less frequent, and steadily decreases in the number of its pulsations; if the pain and tension of the abdomen gradually subside; if the skin becomes covered with a warm and moderate perspiration, and the tongue cleans and has a moist appearance, and especially if there are a fresh secretion of milk and a free lochial discharge, a favourable prognosis may be cautiously pronounced; but not without some reservation, as the disease is of a treacherous character, and the patient suddenly dies when indications all authorized an expectation of the patient's recovery.

Treatment.

The opinion has been expressed by several authors that there is no disease, except the plague, that so certainly and so rapidly destroys life as puerperal fever; and that, if this frightful malady becomes once fully developed, all remedial efforts are utterly unavailing. Gordon, of Aberdeen, too, remarks that this malady must for the most part terminate unfavourably, because "of all acute diseases, the plague excepted, the puerperal fever is, perhaps, the most dangerous;" and yet he states that in his own practice "not more than one out of ten died." Is not this an unintentional acknowledgment on his part that he encountered only the more mild and medicable variety of the disease. And Dr. Campbell, not to be outdone by his distinguished predecessor, found *the disease as curable, if attended to timely, and treated by antiphlogistic remedies, as any other disease.*

Were it allowed me to speak of my own practice, I could say with truth that I have been attending, at times, for upwards of thirty years, puerperal patients with *sporadic* metritis, peritonitis, metro-peritonitis, and phlebitis, and have not lost a single case. Candour constrains me to acknowledge, however, that the cases were all of simple phlegmonous character, and that they yielded kindly to general and topical blood-letting, purges, blisters, diaphoretics, &c. I pretend to no remedies that are not known to my medical brethren, generally, nor to any superior skill in the management of puerperal peritonitis. On the contrary, I am free to acknowledge that if I had been called to attend the malignant epidemic cases of Southwark, and of the Pennsylvania Hospital, my remedial efforts would have been as unavailing as those of the experienced and skilful accoucheurs to whose assiduous attentions they were committed. And had Drs. Gordon and Campbell attended the London epidemic of 1787 and 1788, although they boast of the superiority of their plan of treatment, founded on their superior success, copious depletion, in my judgment would have been no more successful in their hands than it was under the direction of the learned Dr. John Clarke, who declares that it was tried, *but with manifest disadvantage*, and that *leeching was equally pernicious*. Nor do I believe their efforts would have been more availing if they had been called to attend the epidemic of 1746, at Paris, from which none recovered. Dr. Gordon's pathological views and treatment of the epidemic as it appeared at Aberdeen, in 1789, were clearly correct; but at the same time it is equally manifest that it assumed a simple phlegmonous character, and therefore yielded readily to copious depletion. We are not, therefore, to infer from this that every puerperal epidemic is of the same phlogistic character, and will yield to the same antiphlogistic remedies. On the contrary, it sometimes assumes a malignant congestive character, in which bleeding suddenly prostrates all the vital energies, and is followed in quick succession by death. And this form of the disease, in all ages, has baffled the skill of medical men of the greatest professional acumen. Every plan of treatment, however wisely conducted, in some of the typhoid puerperal epidemics, has been utterly unavailing. And what is true of puerperal fever is equally correct in other epidemics. The inflammatory intermittent fever is easily cured;

but the congestive form of the disease is controlled with difficulty. And the difference is equally great between the success of the treatment of inflammatory and congestive dysentery; of inflammatory and congestive continued fever; and of inflammatory and congestive yellow fever. In 1821 the intermittent fever prevailed in Norristown, in a mild inflammatory form, and there was not a single case that terminated fatally; but in 1822, when it assumed a congestive character, there were upwards of sixty deaths. Phlegmonous pneumonia yields ordinarily to copious depletion; but in the *pneumonia typhoides* that prevailed in Philadelphia, in the winter of 1813, the lancet had to give place to purges, diaphoretics, stimulants, &c.

Seeing these things are so, is it not inconsiderate in any physician, however eminent, to set up the epidemic that comes under his notice as the standard in pathology and treatment for all epidemics; and thus attempt to cast reproach upon every medical man that has not been as successful as himself? May not this terrible malady, like other malignant epidemics, be influenced by climate, season, locality, and other inferior agencies, so as to put on different characters at different times and places, and therefore demand great modifications of treatment?

Dr. Gordon is placed by some of his admirers at the head of a series of medical gentlemen, such as Hey, Armstrong, Lee, Campbell, McIntosh, Blundell, Dewees, and others who contend earnestly for the uniform inflammatory character of puerperal fever, and for the necessity of prompt and copious depletion. Upon inquiry, however, I find that his pretensions to originality are without foundation. Did not Hippocrates bleed freely in child-bed fever, and Galen, in the same disease, *ad deliquium*? Did not Gordon's illustrious predecessors, Sennertus, Astruc, Hulme, Leake, Denman, and others, resort with equal boldness to the same depletory measures, and are not their works extant? And will it be pretended by any of his admirers that he manifested a sound philosophical mind when he directed that every puerperal patient should lose from 20 to 24 ounces of blood instead of being depleted, as Rush directed, "according to the state of the case?" Will not some patients bear the loss of thirty ounces better than others will ten? But Dr. Gordon does deserve great credit for the boldness of the treatment he adopted and for

the success that crowned his untiring efforts; and especially, for demonstrating, in opposition to the strong prejudice with which he was surrounded, that one form, at least, of this frightful malady could still be subdued by measures which long experience had proved to be salutary in the treatment of simple puerperal peritonitis.

The valuable work entitled "The History, Pathology, and Treatment of Puerperal Fever," by Drs. Gordon, Hey, Armstrong, Lee, and Meigs, ought to be in the hands of every obstetrical practitioner, because the authors must satisfy every unprejudiced mind that there is one form of the disease in which prompt and copious bleeding and purging are the most effective remedial agents. At the same time it must not be forgotten that there is another form of the disease, congestive and malignant, in which copious bleeding and purging are death. For information on the latter side of the question, I refer to the works of Walsh, White, Hulme, Stall, Joseph and John Clarke, Hamilton, Brenan, Burns, Vanden Zande.

Both parties are right in stating honestly and faithfully what they noticed at the bedside of their patients, and what they learned from necroscopic observations; but the error is in the *exclusion* by which each party endeavours to put down the other.

A case in point. In the Westminster Lying-in Hospital, the two forms of puerperal fever, the *inflammatory* and *congestive*, prevailed in the same year, 1822, in two distinct epidemics, six weeks only intervening between the last case of the former and the first case of the latter.

"In the first of these epidemics the cases were highly inflammatory; the peritoneal covering of the uterus and intestines was chiefly affected; the patients bore bleeding and other active treatment with advantage, the blood drawn was strongly cupped and highly buffed, and the fatal cases were few."

"Six weeks afterwards, a very different epidemic was found to exist. The same remedies were naturally at first tried, but with bad success. The fever was attended by marked depression and debility; the local pain was comparatively slight, the pulse was rapid, with no force and easily compressed. *Here depletion was death.*"—The report of these two epidemics is by the same author, and therefore must be faithful.

I have discussed, at some length, the subject of bleeding in puerperal fever, because I have been satisfied for some time that both parties, its advocates and its enemies, were in error, and were exciting a pernicious influence over the medical profession and the community. As this remedial agent is the principal remedy in the inflammatory form of the disease, and may destroy life in the congestive; how shall we be safely guided in its employment? In making out our diagnosis in the first case, of a puerperal epidemic, we should be careful to note the character of the prevalent diseases. Are they synchoid or inflammatory? We may deplete freely. Are they typhoid or congestive? The lancet must be unsheathed with caution. In the case under consideration do we apprehend, that the pulse which is weak and feeble is depressed—open a vein freely, and if it depends on oppression and not exhaustion, it will soon become strong and full, and the stream will flow more rapidly, proving clearly that depletion is exerting a salutary influence upon the patient. If, on the contrary, after the vein is open, the pulse grows weaker, the blood flows with difficulty, and the patient feels a syncope coming over her—close the orifice immediately and resort to other remedies. Bleeding, in order to be effective, must be prompt and copious—certainly within six hours of the attack of the disease, and nearly double the quantity prescribed upon ordinary occasions. And as a general rule, a second bleeding is not required; but, if we do resort to a second or a third sanguineous evacuation, they must follow close upon each other.

Leeches or *cups* applied to the abdomen over the seat of the pain, are preferred by some modern practitioners to general blood-letting. It is said that leeches applied to the pudenda, were beneficial in the puerperal phlebitis of Vienna, while general blood-letting was found prejudicial.

Purges are useful in every variety of the disease. Gordon gave mercurial purges, calomel and jalap, in large doses, and kept up a catharsis throughout the whole course of the disease. He resorted to purgation, with success, as a *preventive*, as well as a *curative* means.

Emetics of ipecacuanha (15 grains) were administered to all the patients during the epidemic of 1782, at the Hotel Dieu, by M. Doulcet, on the appearance of the first symptoms of the disease. The emetic, followed by a mild aperient, was repeated the next day,

“notwithstanding the diminution of the symptoms.”—The success was wonderful! Two hundred, out of two hundred and five patients, were cured. “*The method of Doulcet*” was hailed with enthusiasm by the profession; but did not long continue in favour.

Blisters are warmly recommended by some practitioners and condemned by others. When applied, they should be placed over the seat of the pain. In the inflammatory form of the disease, after blood-letting, they cannot fail to be useful.

Fomentations, flannels wrung out of hot water, or a flaxseed poultice, placed between pieces of flannel, or muslin, and applied over the whole abdomen, are almost universally employed in all the varieties of the disease.

Oil of turpentine was first administered in puerperal fever, by Dr. Brenan, in 1812, at the lying-in hospital in Dublin. He was lavish in his praises of its efficacy at the time, but it soon fell into disrepute with the profession.

Mercurial preparations are highly recommended by M. Vander Zande and others, administered with a view to produce salivation as quickly as possible.

Diaphoretics, consisting of nitre calomel and tartarized antimony, of blue mass opium and ipecacuanha, the Dover’s powder, &c., with a view to produce perspiration and assuage pain.

Opium alone, or in combination with calomel and ipecacuanha, is extolled by many authors. Gordon purged throughout the day, and gave opium alone, at night, “in order,” as he remarked, “to give a respite to nature.”

In the puerperal epidemic of Southwark, according to Dr. Condie, “early and copious venesection, and purging were tried, followed by fomentation and blisters to the abdomen, and Dover’s powder, the nitrous powders with calomel, pills of blue mass opium and ipecacuanha, spirits of turpentine, &c., internally. Under every variety of treatment, the disease has appeared to run pretty much the same fatal course.” Copious depletion was tried in the epidemic, at the Pennsylvania hospital last spring; but without success.

Professor Huston, who attends the lying-in department at the Philadelphia hospital, is opposed to the abstraction of blood, and advocates calomel, opium, carbonate of ammonia, &c., internally, with fomentations to the abdomen, and sinapisms to the feet—as under this treatment, some of his patients, in that institution, recovered.

Prophylactics.

A precise knowledge of the causes which produce a disease, is essential to the adoption of appropriate prophylactic measures.

A number of accoucheurs attached to extensive lying-in hospitals, among whom I may mention Dr. Joseph Clarke, and Dr. Collins, observed that parturient females recovered more slowly than usual from the effect of their accouchement, for some time before puerperal fever commenced in their respective institutions. This fact proves that the disease has its origin in a distempered state of the atmosphere, which must increase to a certain height of depravity, before it is capable of producing the malady in its epidemic form. It becomes us, then, as soon as we discover any such evidence of the approach of this frightful malady, to search out diligently the morbid causes that are corrupting the air of the lying wards and remove or counteract them; especially, as we have reason to fear that local agencies sometimes act as auxiliaries to epidemic causes, and thereby convert an epidemic into a contagious disease.

Besides, as the *exciting causes* must unite with the epidemic, or contagious agency, before the disease can be developed in the system, it is essential that these *excitants* should be carefully avoided.

Difficult labour is an exciting cause; let the accoucheur be particularly careful, therefore, at such times to produce the least possible irritation in his obstetrical manœuvres, or operations. Violent mental emotion, another exciting cause, should be carefully guarded against. Beware of removing the placenta too hastily, and of allowing the slightest fragment to remain. Remove also from the uterus large clots of blood. Guard against constipation of the bowels. Gordon remarks, that "the purging bolus," (three grains of calomel and two scruples of jalap,) "which was so effectual in the cure, was equally efficacious as a preventive. This bolus was given the day after delivery, in the morning, and it either prevented the disease altogether, or anticipated the cure before it made its attack." Bleeding, too, occurred to him as a probable means of preventing the puerperal fever, although he did not try it: "for I was called," says he, "to several cases of *flooding* in time of labour; and I observed that those were the only women, delivered by me, who escaped the puerperal fever in the epidemic season."

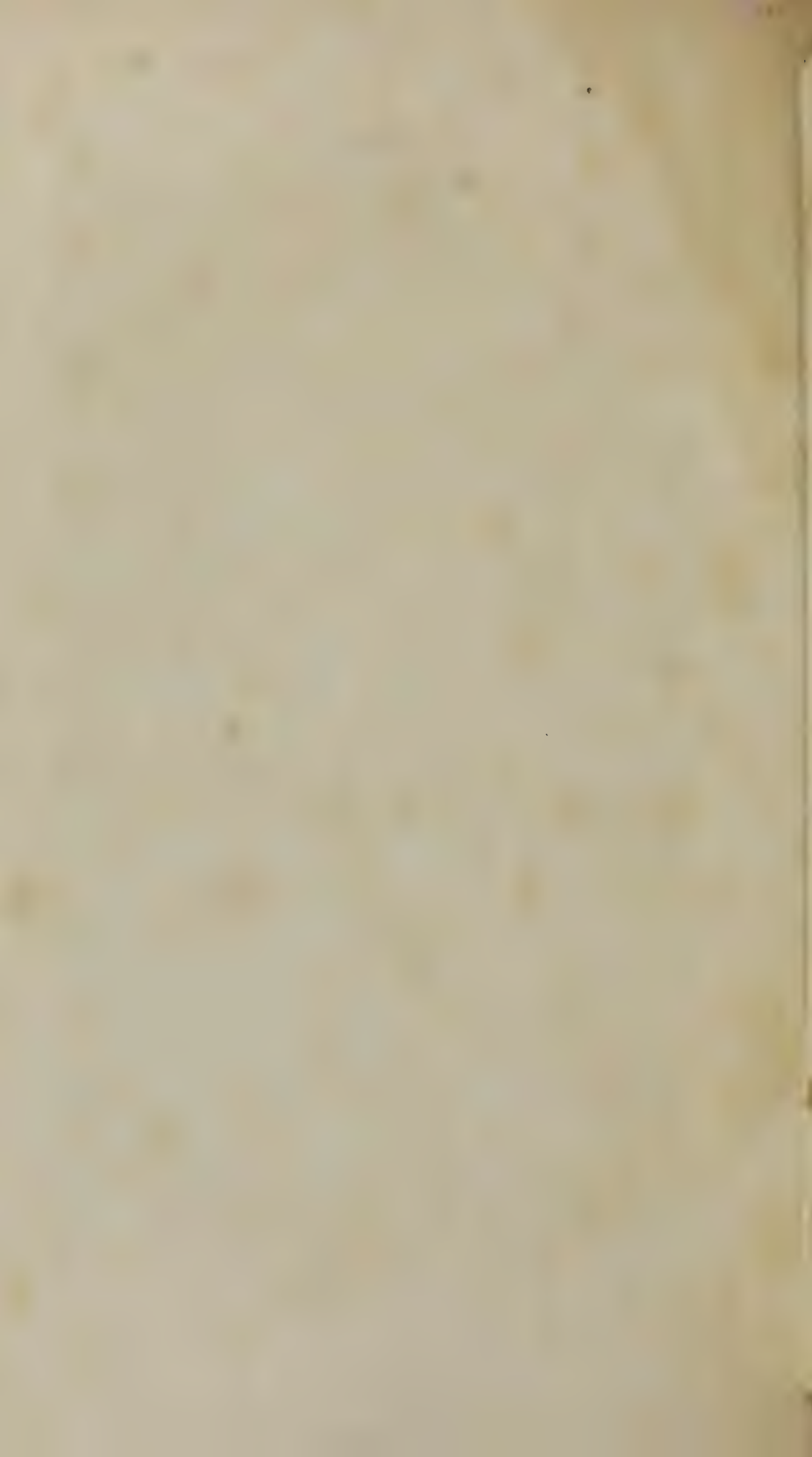
To counteract, or destroy the infection in the lying wards, various plans have been proposed. Free ventilation and cleanliness are admitted by all to be valuable prophylactics. The ingenious Dr. Lind attempted to demonstrate that *fire* and *smoke* are the only certain antidotes to infection. The purity of the atmosphere cannot be maintained in the hospital wards, "as long as several females *en couches* are assembled in the same apartment." Each patient must be allowed a separate chamber.

It is certainly a misplaced kindness, a mistaken charity, to remove females from their own humble domicile to an asylum in which each apartment has several inmates, afflicted with a frightful disease that threatens to involve all that enter with its dreadful ravages. When the disease first manifests itself in a hospital, those affected should be immediately removed to another part of the house, so as to be separated far from the rest; placed in separate chambers, and, when one dies, let the bed and bedding be removed, washed and aired; and the ward washed and white-washed, before another patient is admitted into it.

As there is reason to apprehend that accoucheurs sometimes carry the infection from patient to patient in their clothes, they should guard against it, by frequent changes and ablutions. "It is a disagreeable declaration for me to mention," says Gordon, "that I myself—was the means of carrying the infection to a great number of women." And "I had evident proofs," he elsewhere remarks, "that every person who had been with a patient in the puerperal fever, became charged with an atmosphere of infection, which was communicated to every pregnant woman who happened to come within its sphere." If these things are so, medical men cannot be too diligent in attending to their daily purifications.

In conclusion, I would remark, that notwithstanding the thorough investigation I have given the subject, there are still certain points connected with the *pathology* and *treatment* of *puerperal fever* about which my mind is not fully satisfied, and when I revert to the little success that has attended our efforts to arrest its ravages, I am constrained to unite in the sentiment of all candid medical men, that the disease is still "the pestilence which walketh in darkness," entailed upon her posterity by "the mother of all living."





as well as that from the uterus. After this period females are not so nervous, but a peculiar kind of sensibility is developed.

This in connection with the venous engorgements will explain many of the diseases & ~~the~~ anomalous symptoms, to which ~~the~~ females are liable.

Treatment of children } Depends much upon the constitution & temperament. The general rule is to do every thing to promote the development of the child & give tone to the system.

1. Pressure (as tight dressing lacing &c) presents so desirable an object in the viscera.

2. Bad posture & being too long in one position is extremely injurious.

3rd Exercise should be directed - especially in the open air & rough, as, running, dancing, riding &c

4. Diet - should be to young females, nutritious, but not too stimulating.

5. The secretions & excretions, are not to be overlooked - they should be examined into in regard, quality, quantity &c.

6. Bathing is highly useful, especially the cold bath. Cleanliness must not be neglected. At least 8 hours sleep should be allowed young persons.

The period of menstruation usually requires no treatment at the hands of the practitioner, when the patient is plethoric, bleed & purge "Reduce the system to the secreting point" When the opposite state exists, tone must be given to the system, "stimulate to the secreting point" (Rush)

Yardale

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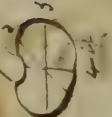
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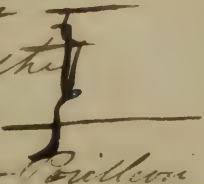
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4 inf. 0/



2 inf. 3/



- Measurements of the Pelvis - Dr. Hodge
- 1 Depth of the hollow of the sacrum $\frac{1}{2}$ in
 - 2 When the coccyx is attached - 1 in
 - 3 Breadth of the base of sacrum - 4"
 - 4 Length of sacrum 4"
 - 5 Breadth of the junction of the

 $1\frac{1}{2}$ "
 - 6 Superior pelvis or Billon
 - 7 From crest to crest of
 { Ant. sup. spinous process - 9"
 - 8 Depth of Superior pelvis - 3 or $3\frac{1}{2}$ "

Pelvis Proper

The sup. strait is formed by the symphysis pubes, horizontal portion, crest of the pubis, the linea dis-pectinea, wing of the sacrum & promontory of sacrum -

- 9 Circumference of sup. strait - 13

Its shape is irregularly triangular or elliptical

- 10 { Ant. post. - sacro-pubic, conjugate or
 { shortest diameter - 4

- 11 Long - Bis-iliac or transverse diameter - $5\frac{1}{4}$

- 12 Oblique, or from a point corresponding
 with the acetabulum to the sacro-iliac synchysis - 5

The axis of this strait continued downwards would strike the coccyx, & continued upwards would strike the umbilicus.

Measurements

Superior Pelvis

{ From Sup. Anterior spinous process to So
transversely — 9

From Crista illium to So 11

Depth Laterally — $3\frac{1}{2}$

Superior Strait

Diameters { Antero-posterior — 4
Transverse — $5\frac{1}{4}$
oblique — 5

Inferior Strait

Diameters { Antero-posterior — $4\frac{1}{2}$
Transverse — 4
oblique — 4

The axis of the superior strait if
Continued upwards would pass
through the umbilicus; and the
axis of the inferior strait would
strike about the second bone of
the Sacrum — Consequently

the two axes would form an angle that is: the axis of the superior strait projected downwards, and the axis of the inferior strait carried upwards would form an angle at the point of intersection of from 125° to 135°

{ From the apex of the arch of the pubes
to the promontory of the sacrum $4\frac{1}{2}$

{ From the same place to the
Concavity of the sacrum ——— $4\frac{3}{4}$

{ Depth of the pelvis proper at
the symphysis pubes ——— 12

{ From the promontory of the sacrum
to the apex of the coccyx, or the
posterior depth ——— $5\frac{1}{2}$

Height of the arch of the pubes. 2
or a line let fall from the apex of the arch of the
pubes to a line drawn from one tubercle
to the other measures 2 in.

Of the child

Length of the child — 18 to 24 in
 From one acromion process to the other 3 to 3½
 Antero-posterior diameter of the chest — 2½ to 3

Child of the Dead

Biparietal or Transverse — 3½
 Perpendicular — 3½
 Occipito-frontal — 4
 Perpendicular of the face — 3
 Transverse — do — 2½
 Trachelo-magmatic — 3
 Base Cranium
 Transverse — 3½
 Largest or Occipito-mentals 5
 Forehead present.
 From the chin to the middle of the sag-
 suture, or the Ment. Sagittal — 4¾
 Transverse — 3½

The Inferior strait is formed by the
sub-pubic ligament, ^{ramus of the pubes}
ramus of the ischium, ^{the ilio-pectineal} great sacro-sciatic
ligament - & point of the coccyx.

- 13 Circumference of this strait ——— 12 in
 14 Long, Ant-posterior, Coccyx-pubic — 4½
 15 Transverse diameter ——— 4
 16 Oblique, or from ramus of ischium
to the middle of the great ligament — 4

The axis of this strait if continued
 upwards would strike the 2^d bone of
 the sacrum.

The cavity of the pelvis is contained be-
 -tween the the straits.

- Anterior depth ——— 1½ in.
 Posterior (from Promontory to point of coccyx) 5 in.
 Lateral (from linea ilio-pectin. to tuber Ischium) 3½ in.
 From top of the arch of the pubes to the
promontory of the sacrum ——— 4½
 From top of the arch to the
hollow of the sacrum ——— 4¾
 From tuber Ischium ^{top of} to sacro-iliac
symphysis ——— 5 in

The spine of the ischium divides the pelvis
 into two inclined planes
 The spinal column & sacrum make an angle of 135°

of the Fetus

Length ————— 18 to 20 in

Transverse diameter of chest — 3 in

Antero-posterior do — 2 1/2 in

Transverse diameter of Pelvis — 2 in

Anterior-posterior do — 1 1/2 in

It is of great importance always to bear in mind that the whole fetus is very compressible.

of the head. Ant. angle of the ant. fontanelle is acute, the posterior is comparatively obtuse.

Diameters of the head

Short- Transverse or Biparietal — 3 1/2 in

{ Perpendicular, or from the nape of the neck to the ant. fontanelle, or the occipito-Bregmatic } = 3 1/2 in

Longitudinal or occipito-frontal — 4 in

Longest; — oblique or occipito mental — 5 in

Fronto-mental — 3 in

Bimalar — 3 in

{ Trachelo-bregmatic, or from trachea to the ant. fontanelle — } = 3 1/2 in

{ The Ant. Inclined plane is much the longest of the Pelvis.

the Great occipital extremely present.
we have. Biparietal $3\frac{1}{2}$ - Perpendicular $3\frac{1}{2}$

{ Chin Presentation
we have the same diameters

{ Top of the head Presentation
occipito-frontal 4 in Biparietal $3\frac{1}{2}$

Base of the Cranium presentation
occipito-mental 5 in & Biparietal $3\frac{1}{2}$

Side of the head Presentation
occipito-mental 5 in & occipito-Pregma. $3\frac{1}{2}$

{ Facial Presentation
Involves the Biparietal $3\frac{1}{2}$ & Trachelo-Pregma. $(3\frac{1}{2})$

{ Forehead Presentation
Sagittomental $4\frac{1}{2}$, that is from the middle
of the sagittal suture to the chin,
the ~~hind~~ Biparietal $3\frac{1}{2}$

Uterus

Length of uterus $2\frac{1}{2}$ in

Breadth of Do $1\frac{1}{2}$ "

Thickness of Do 1 "

more flattened on the anterior surface than on the post-
erior. Length of the neck of uterus 1 in

Length of fallopian tubes 3 to 4 in.

The menses come from the Uterus. The menstrual membrane has peculiarities in its organization. No fibrin is found in the secretion, hence it does not coagulate spontaneously. In tropical climates it appears at ~~about~~ the 9 to 13 yrs.

In temperate climates from 13 to 15

In cold latitudes 16 to 18

The duration of the period of menstruation is about 5 days, but varies much. Quantity discharged 4 to 60z, but is very inconstant. Strumpets usually menstruate copiously.

They occur at regular periods, once every lunar month or 28 days. Disappear at from the 45 to 50 years. This takes place gradually - not at once; or becomes irregular.

This is called the critical period, or the commencement of old age. The female undergoes great change at this period; it again stimulates that of the male. A disposition to disease occurs at this time.

The irritation which follows, the cessation is of a dangerous or malignant tendency, being prone to develop scirrhus &c.

During pregnancy & lactation, menstruation does not occur. The cause of menstruation is not known. Summer influenza, general plethoria &c were formerly some of the more exploded notions.

A peculiar local plethoria, has something to do with it. The irritation is not in the uterus, but in the ovaries. Without their presence menstruation will not take place.

At the critical period of life, a diminution of the capillary circulation ~~occurs~~ of the skin is observed, and a disposition to internal congestion also a diminution of the various secretions

